ENGINEERING NEWS-RECORD

DECEMBER 6, 1956

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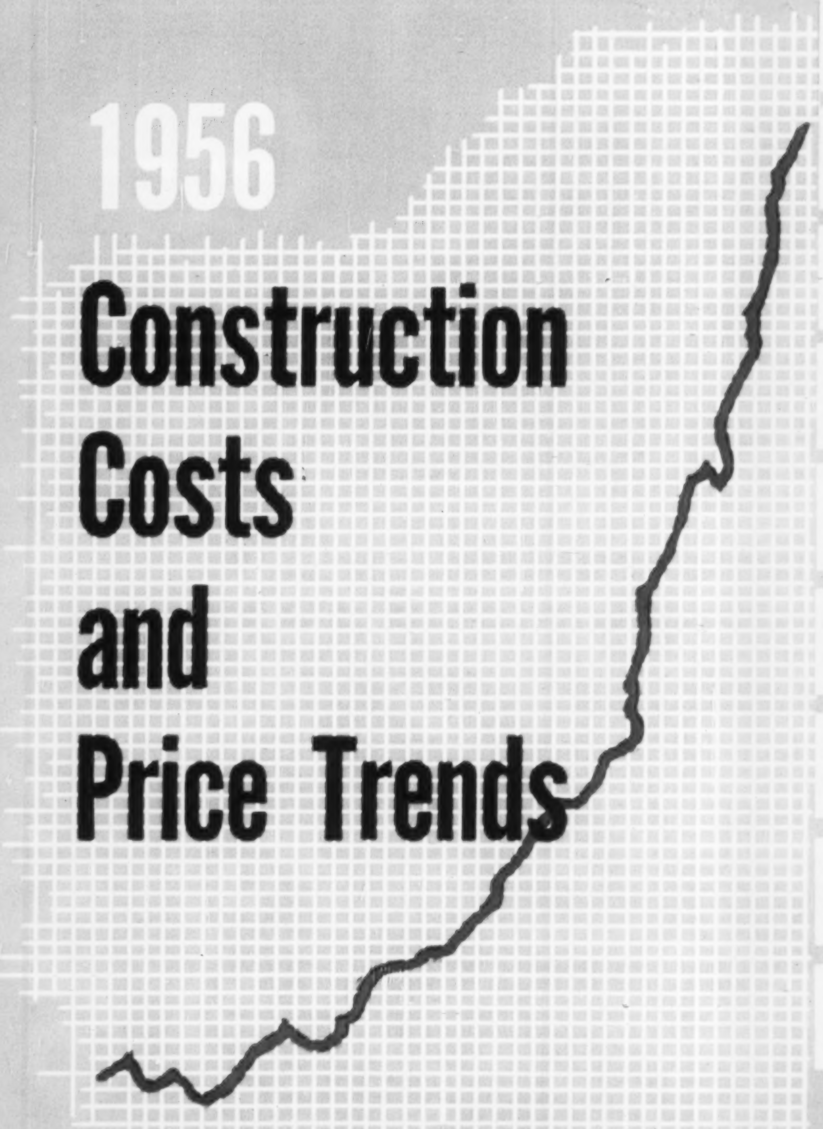

1956

Construction Costs and Price Trends

CONSTRUCTION COST INDEXES 1913-'56

BUILDING COST & PRICE INDEXES

HIGHWAY PRICE TRENDS

WORLD WIDE PRICES & WAGES

MATERIALS PRICES & SUPPLY

LABOR RATES, INSURANCE

EQUIPMENT PRICE TRENDS; RENTALS

FINANCING COSTS

UNIT PRICES

SPECIAL FEATURES

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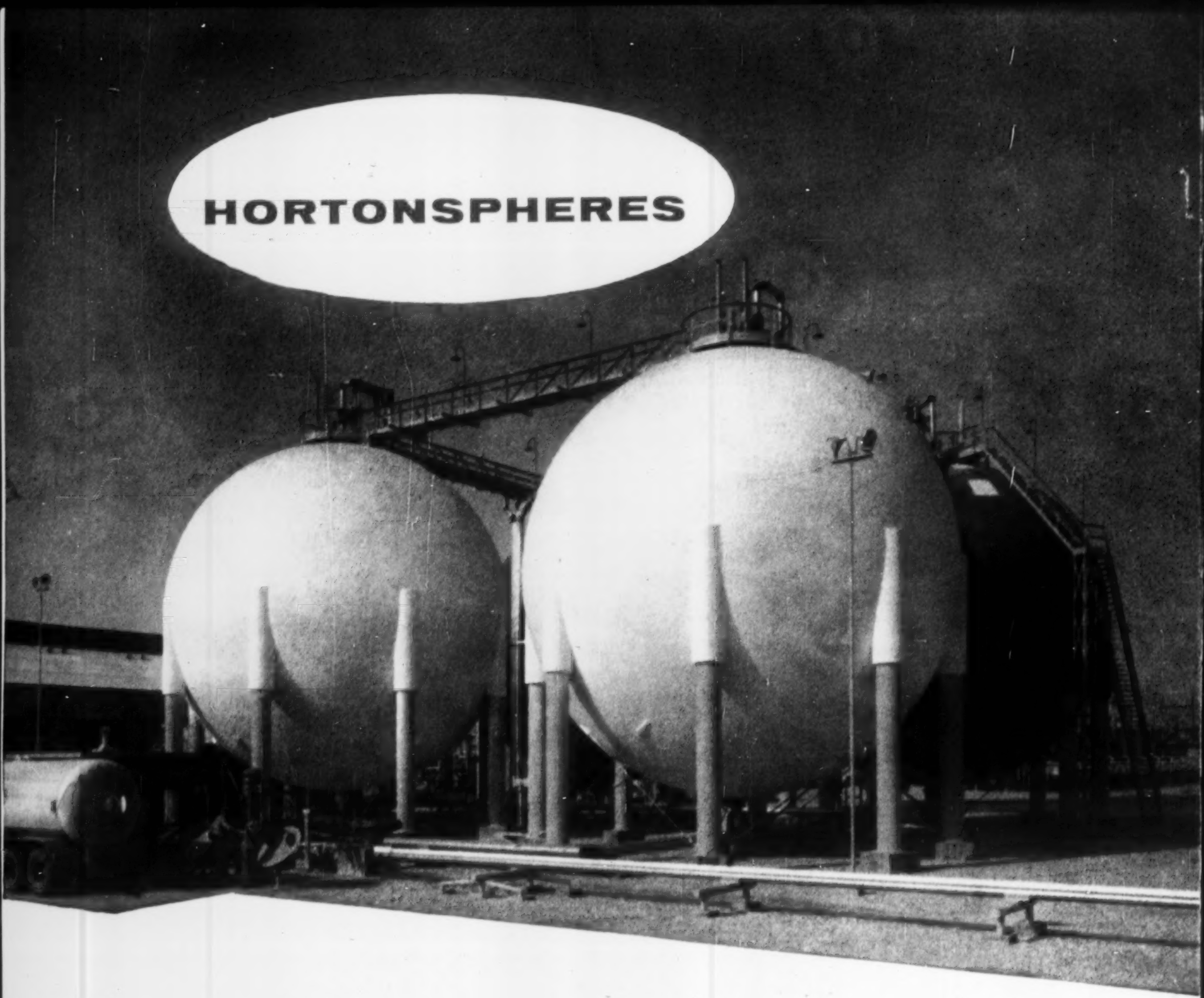

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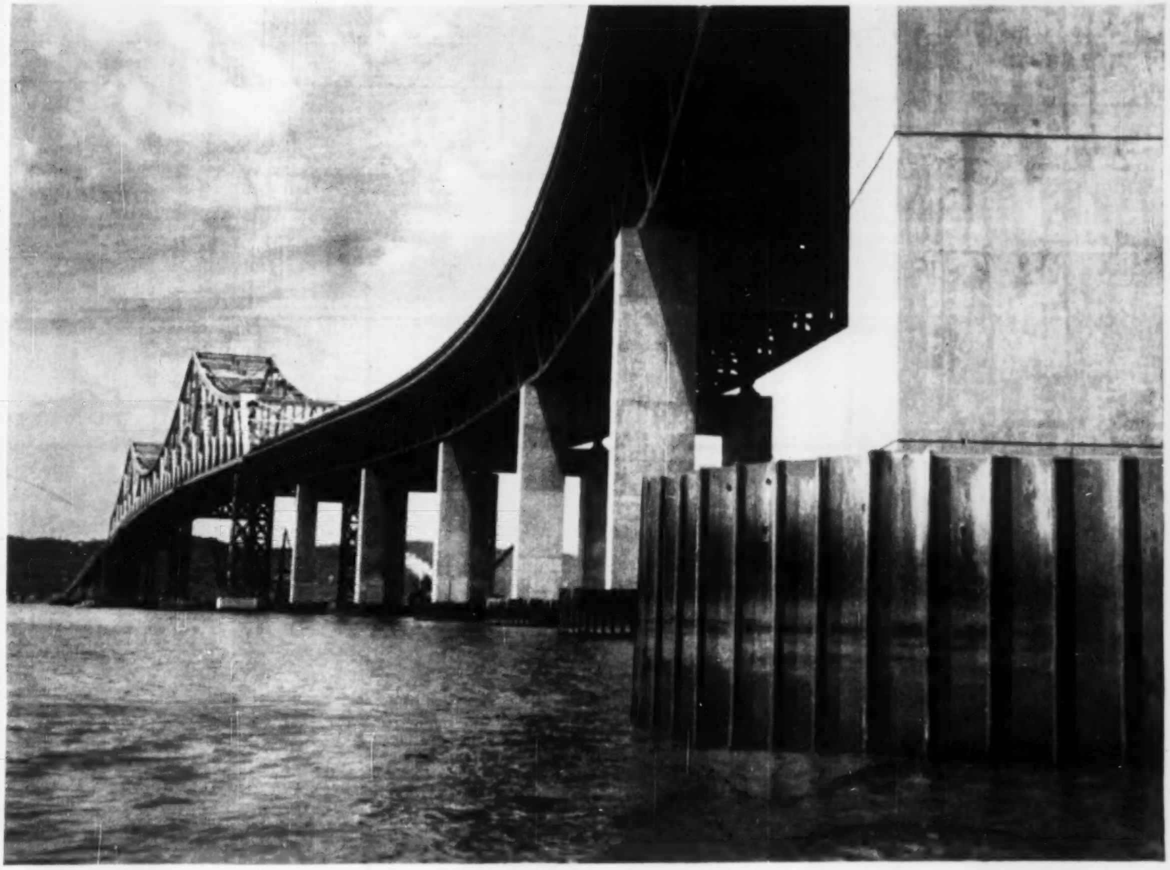
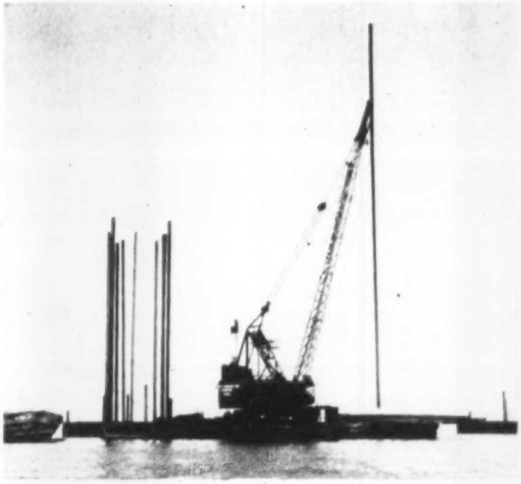


Tappan Zee Bridge as seen from the water level. In construction of the piers nearly 20,000 tons of Bethlehem steel sheet piling and steel H-piles were used.

Steel H-Piles Driven to Rock for Tappan Zee Bridge Piers



Driving 185 ft H-pile for deep-water pier.

The New York Thruway's Tappan Zee Bridge, crossing the Hudson from Nyack to Tarrytown, is nearly 6 miles long – 3¼ miles over water. The bridge roadway has six traffic lanes, with a 10-ft center mall. Height of roadway above water is 160 ft.

For the water piers, Bethlehem steel H-piles were used, driven to bedrock in cofferdams built of Bethlehem steel sheet piling. The length of H-piles in these piers varied from 60 to 130 ft. For eight deep water piers, hollow concrete caissons carry part of the load through buoyancy, the balance being taken by pipe caissons with H-pile cores driven to rock. These H-piles were approximately 200 feet in length.

Merritt-Chapman and Scott Corporation placed 17,268 tons of Bethlehem steel H-piles and 2536 tons of Bethlehem steel sheet piling in the construction of the piers for the Tappan Zee Bridge.

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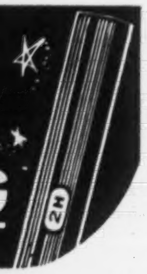

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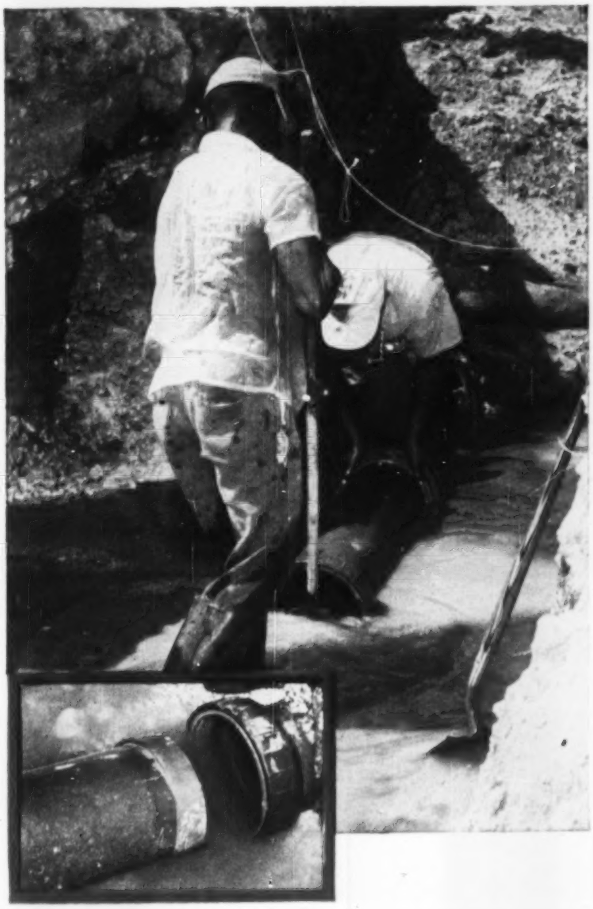

PROJECT. City of Ft. Lauderdale, Florida — Sanitary sewer.
ENGINEER: E. L. Patterson, City Engineer, Ft. Lauderdale, Florida.
CONTRACTOR: Zinke Smith, Pompano Beach, Florida.
PIPE: 8" UNIVERSAL Vitrified Clay Pipe with pre-assembled TYLOX Gaskets.

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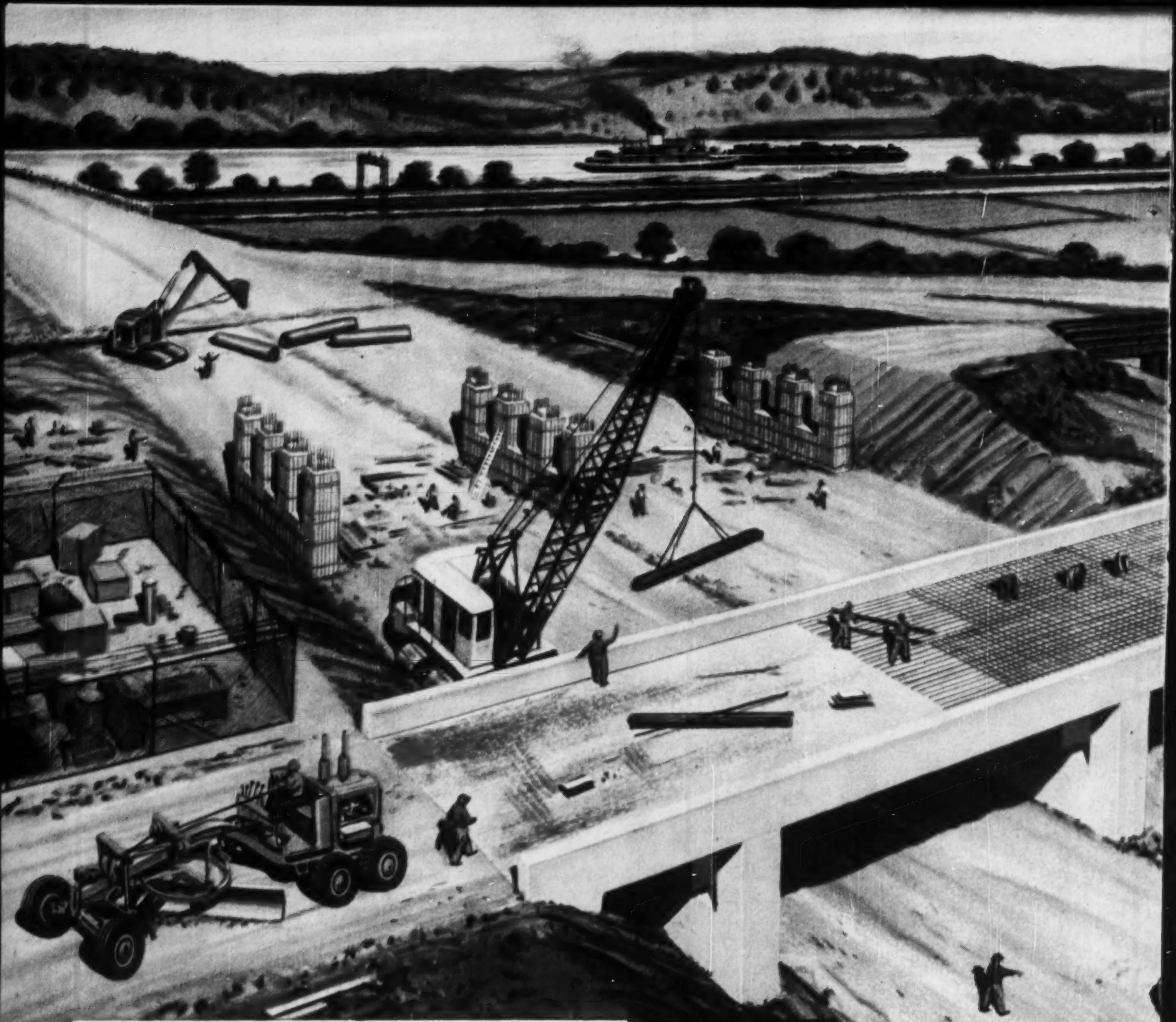

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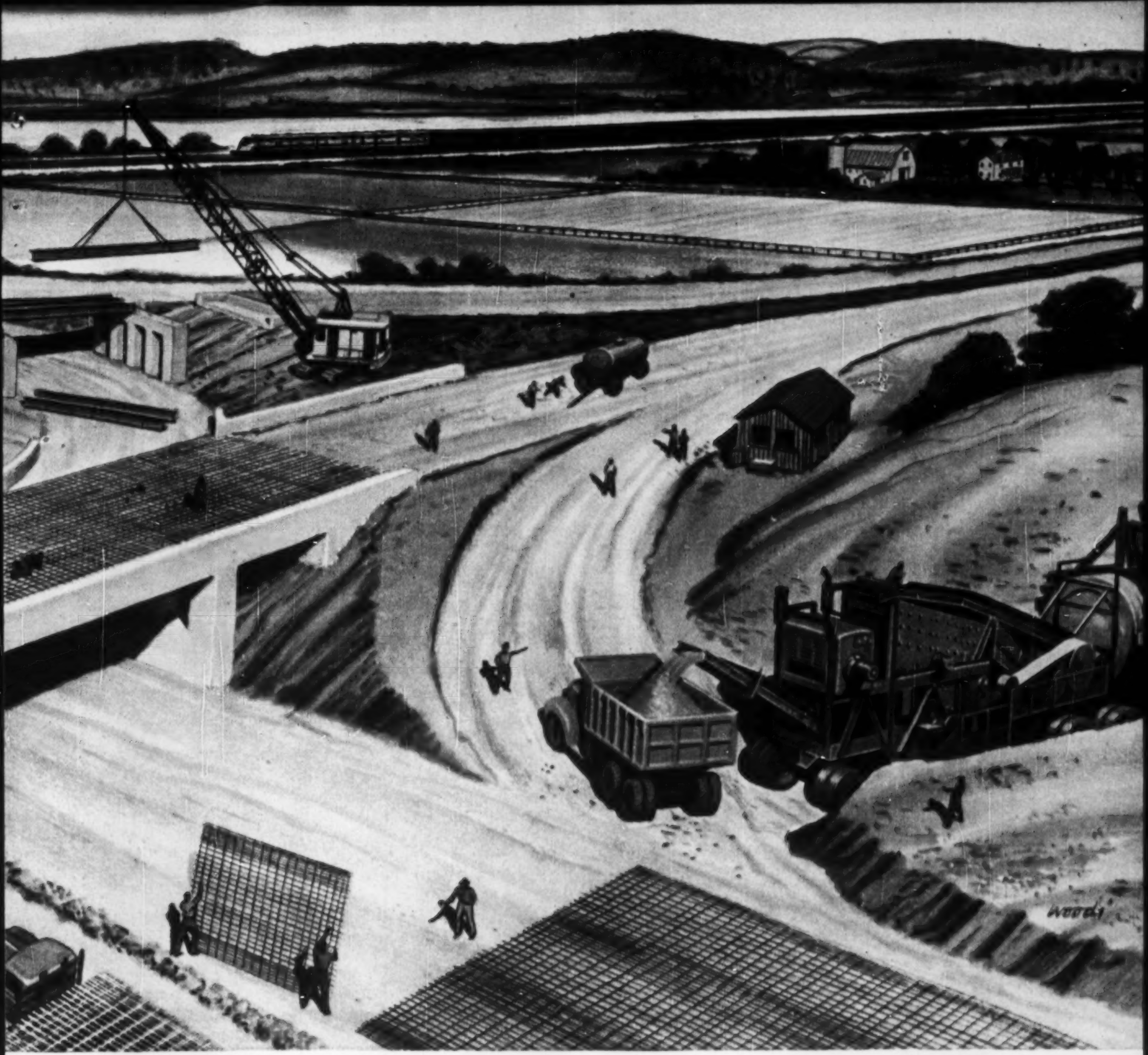

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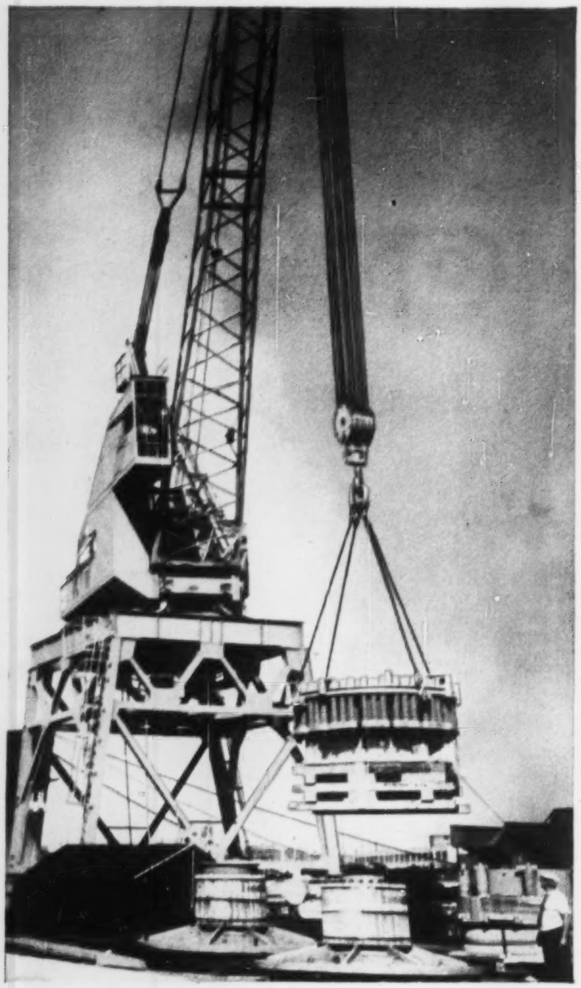

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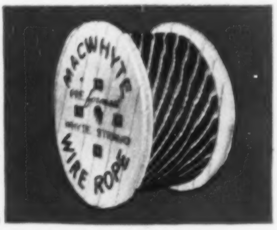

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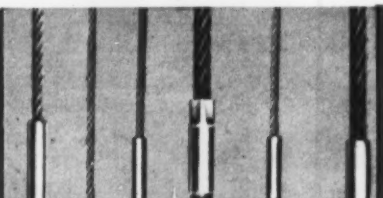

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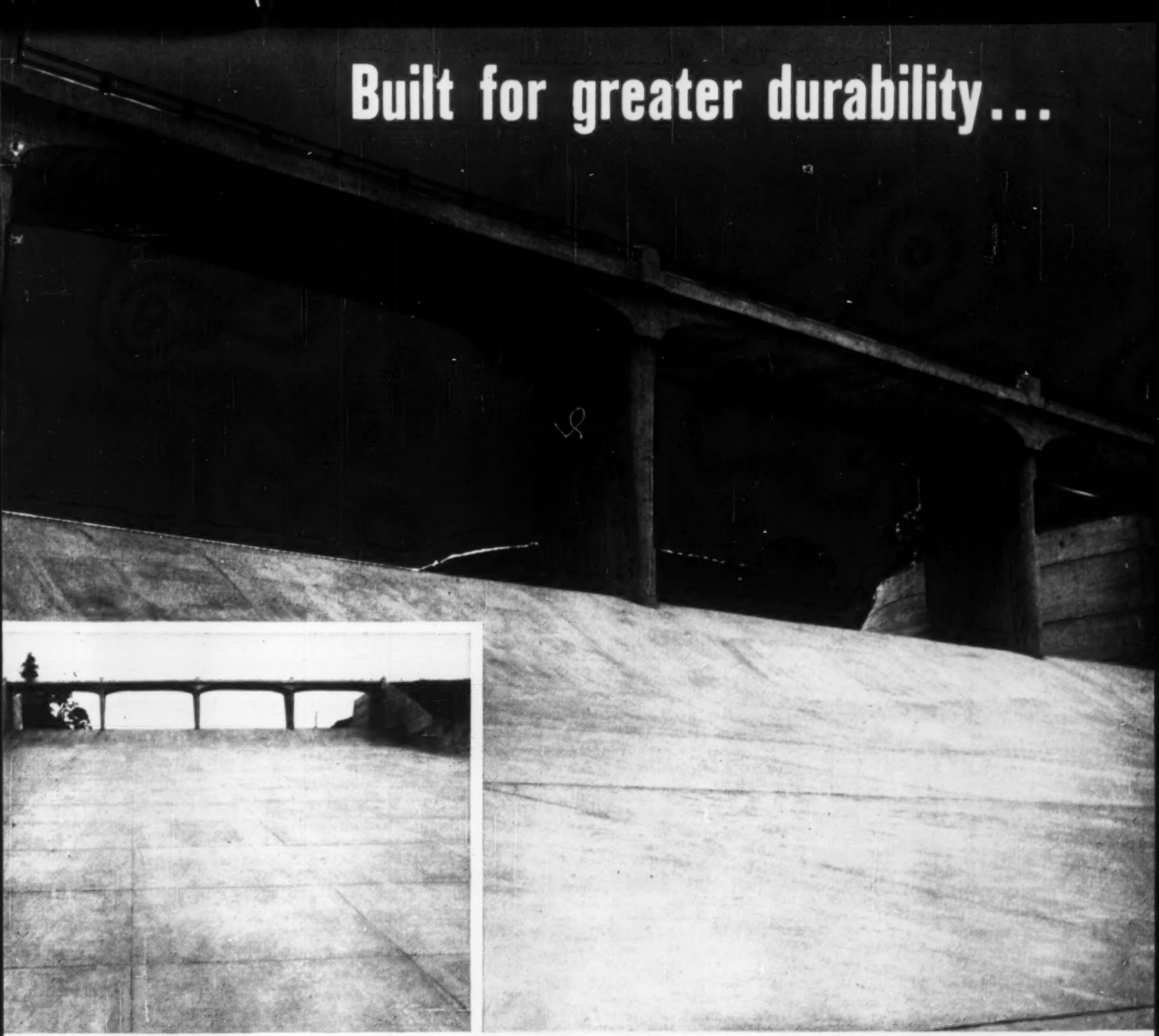

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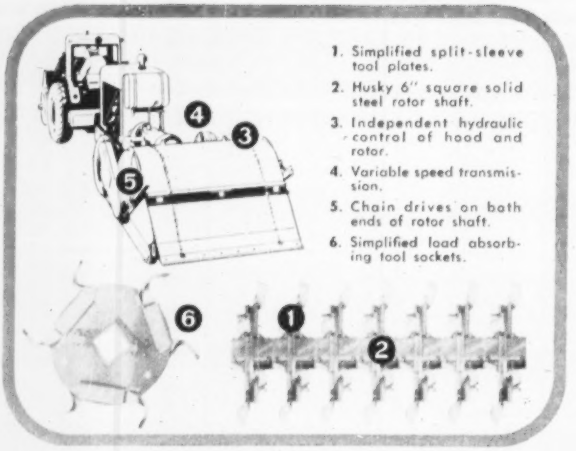

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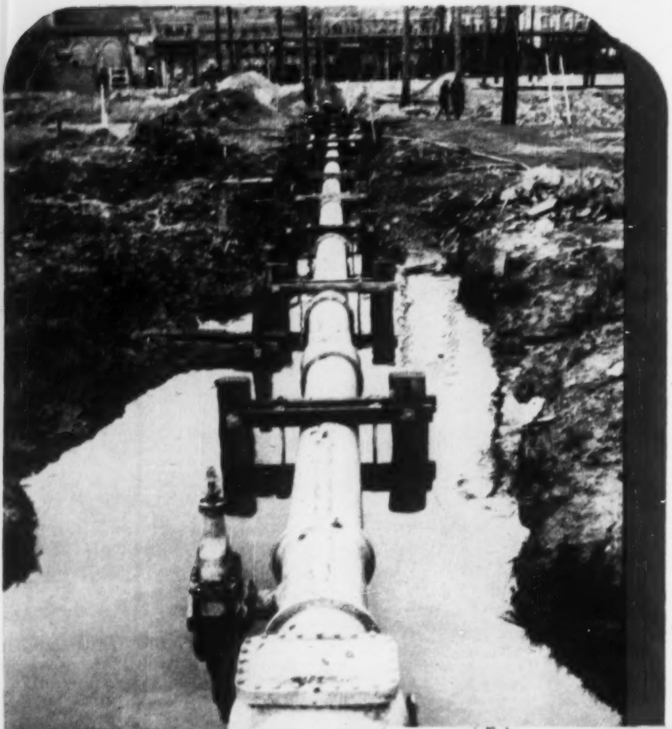

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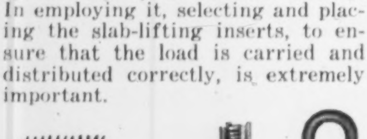
Pre-casting & Lifting Concrete Slabs

Richmond Spiders contribute speed and safety

Contractors recognize that tilt-up construction using thin, precast slabs offers substantial economies for certain types of buildings—when properly used. The method, originally developed in the Far West for earthquake resistance, has spread rapidly across the country. In employing it, selecting and placing the slab-lifting inserts, to ensure that the load is carried and distributed correctly, is extremely important.



Since, for example, the slab-lifting inserts near the top of the slab carry virtually the total load when the initial pick-up is made, severe impact and handling loads in both tension and shear develop in them. A substantial safety factor is a must — and that means extra strong, reliable insert units, and a conservative load application.

With its Spider Anchors, especially designed for pick-up and placement of thin slab sections, Richmond recommends that at least 50 per cent impact be added to the dead load to establish a working load. A 2:1 safety factor should be maintained in the relation of this working load to the established ultimate strength of the anchorage units in the concrete. Equally important, the anchorage units should not be figured at full strength until the concrete of the slab has reached a minimum compressive strength of 3,000 lbs. p.s.i.

Tests have shown that the actual tensile strength of Richmond Spiders is far greater than Richmond's recommended maximum working load—a margin of safety that gives you added assurance of a fast, economical job. There are Richmond Slab Anchors especially designed for anchoring blocks and fixtures to the floor slab for bracing slabs into vertical position; Slotted Lagstuds for setting Spiders so as to permit screed finishing; Square-Head Tylags for anchoring lifting fixtures. Richmond drop-forged steel-lifting Eye Bolts are designed to develop the full strength of the bolts.

INSIST ON RICHMOND AND BE SURE IT'S RICHMOND!
Richmond
SCREW ANCHOR CO. INC

The new Richmond Handbook gives complete technical data on these and all other Richmond-engineered tying devices, anchorages and accessories. It will help you to pour concrete better and more economically. It's yours for the asking. Write to RICHMOND SCREW ANCHOR COMPANY, INC., 816 Liberty Ave., Brooklyn 8, N. Y. or 315 South 4th St., St. Joseph, Mo.

Reader Comment

Better Building Inspection

SIR—As a commercial testing laboratory, we are very much in accord with views you expressed in an editorial entitled, "Better Building Inspection" (ENR Nov. 8, p. 160).

Incidentally, on a large school job here in Spokane, the architects set up an allowance for compaction testing in the bid proposal and this procedure resulted in a much better relationship. Unfortunately, this type of action is a rare exception rather than the rule.

It does no credit to architects that inspection and testing—or the omission of both—are sometimes competitive items when projects are discussed with prospective owners.

JOHN C. COOK, P. E.
Washington Testing Laboratories, Inc.
Spokane, Wash.

"Ideal" and "Model" Laws

A reader comments that some confusion may arise with respect to an Ideal Engineering Registration Law, which a committee of the National Society of Professional Engineers has recently drafted, and the Model Law for the Registration of Professional Engineers, upon which most of the present state registration laws are based. It was stated, in error, in our news account of the NSPE fall meeting (ENR Nov. 1, 1956 p. 27) that "present laws conform generally, but in varying degrees to NSPE's Model Law of 1946, which still stands as the society's basic pattern for legislation in this field." It is not NSPE's Model Law, but one in which all the major engineering societies have had a hand, with the American Society of Civil Engineers being the originator and continuous proponent.

As far back as 1911, the Board of Direction of the ASCE appointed a committee, which drafted an "Act to Provide for the Licensing of Civil Engineers." This was followed in 1915 by a joint committee of six national engineering societies which prepared a new draft. Successive revisions prepared by other joint committees followed over the years with additional societies taking part (the NSPE in 1937). The last revision was made in 1946.

The Model Law has thus been the guide that the state laws now on the books have followed. But about two years ago, the NSPE appointed a committee to draft a new law, believing it was necessary to have a law that "in-

(Continued on page 20)

Today's Highway Traffic demands bridges of FABRICATED STRUCTURAL STEEL

The Pennsylvania State Highway Bridge at Sharon is another notable steel structure by Fort Pitt Bridge Works.

Higher Speeds And Heavier Loads Require Bridges That Are:

- Stronger
- Permanently Safe
- Able to Withstand Greater Abuse

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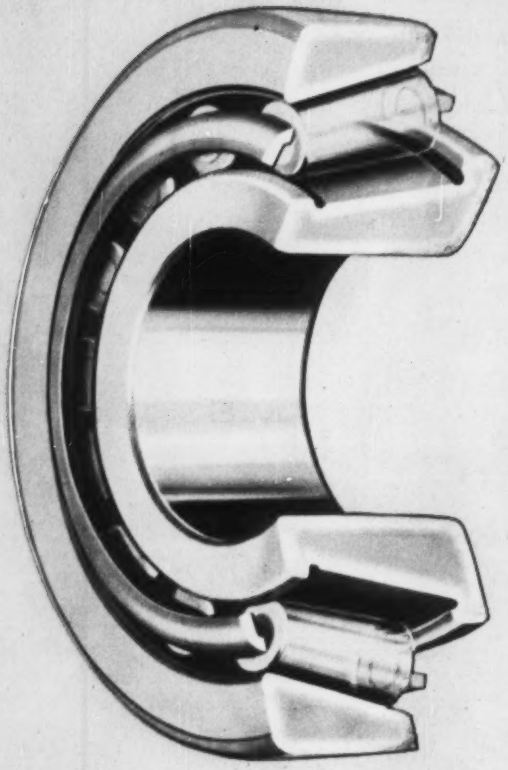

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Depending on your own particular needs, he'll make sure you get the exact size and type—selected from Bower's complete tapered line—engineered to assure maximum performance in your application.

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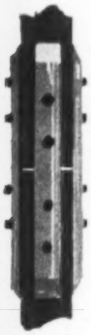
BOWER ROLLER BEARING DIVISION • FEDERAL-MOGUL-BOWER BEARINGS, INC., DETROIT 14, MICH.

"Trees jest don't grow long enough for this here job," grumbled Paul Bunyan to Babe, the Blue Ox. He was driving piles for his bridge across Lake Michigan. "Now if I could git me one o' them machines * the Baxter folks developed, Babe, I could splice me up a piling 900 feet long and get to the bottom o' this pesky pond."



BAXCO PRESSURE TREATED PILING *(spliced or unspliced!)*

* As a matter of fact, Paul, we *did* develop a pile-splicing machine—the only one of its kind in the world. It happened this way: engineers found that record length piling—160 feet long—would be required for the pier fender structure on the Richmond-San Rafael bridge in San Francisco. No such lengths existed. So what to do? So BAXCO engineers got busy with blades and motors and wheels—and came up with the answer . . . an efficient machine that spliced together 1448 of the longest pilings ever seen. And did the job in record time.

P.S. We are not inventors—except when necessary. We are producers of pressure-treated forest products: poles, piling, structural timbers, etc. But you'll find that same spirit pervades the entire BAXCO organization—*to give the customer what he wants*, when he wants it. Inquire today.

Douglas-fir piling from our own stands of West Coast timber . . . Creosote pressure treated to Federal and AWPA specifications.

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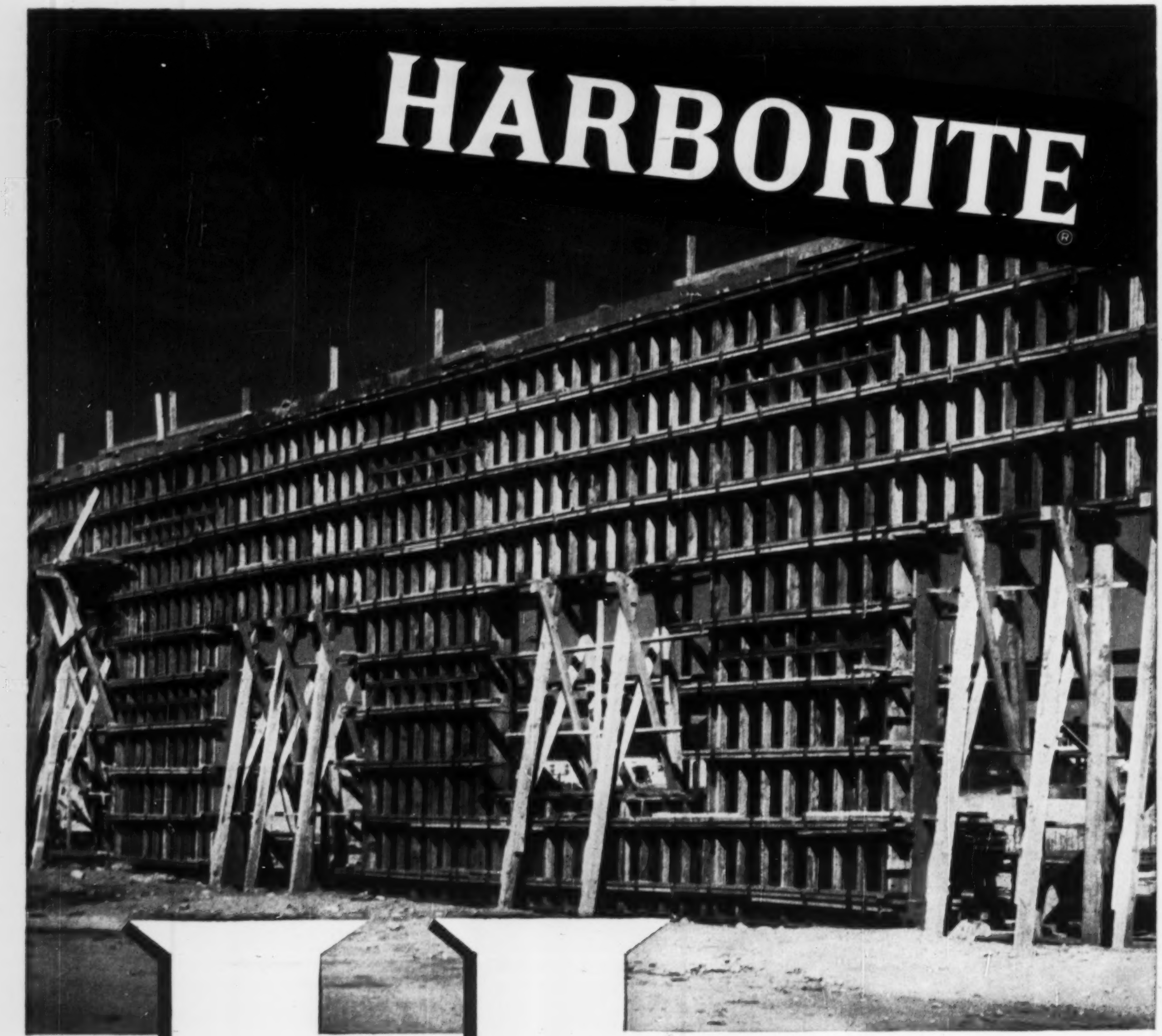

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WAREHOUSE COST PER FOOT*	$.242	$.308	
AVERAGE NUMBER OF RE-USES	10	40	
COST PER POURED SURFACE FOOT	$.0242	$.0077	

*Prices vary in different areas.

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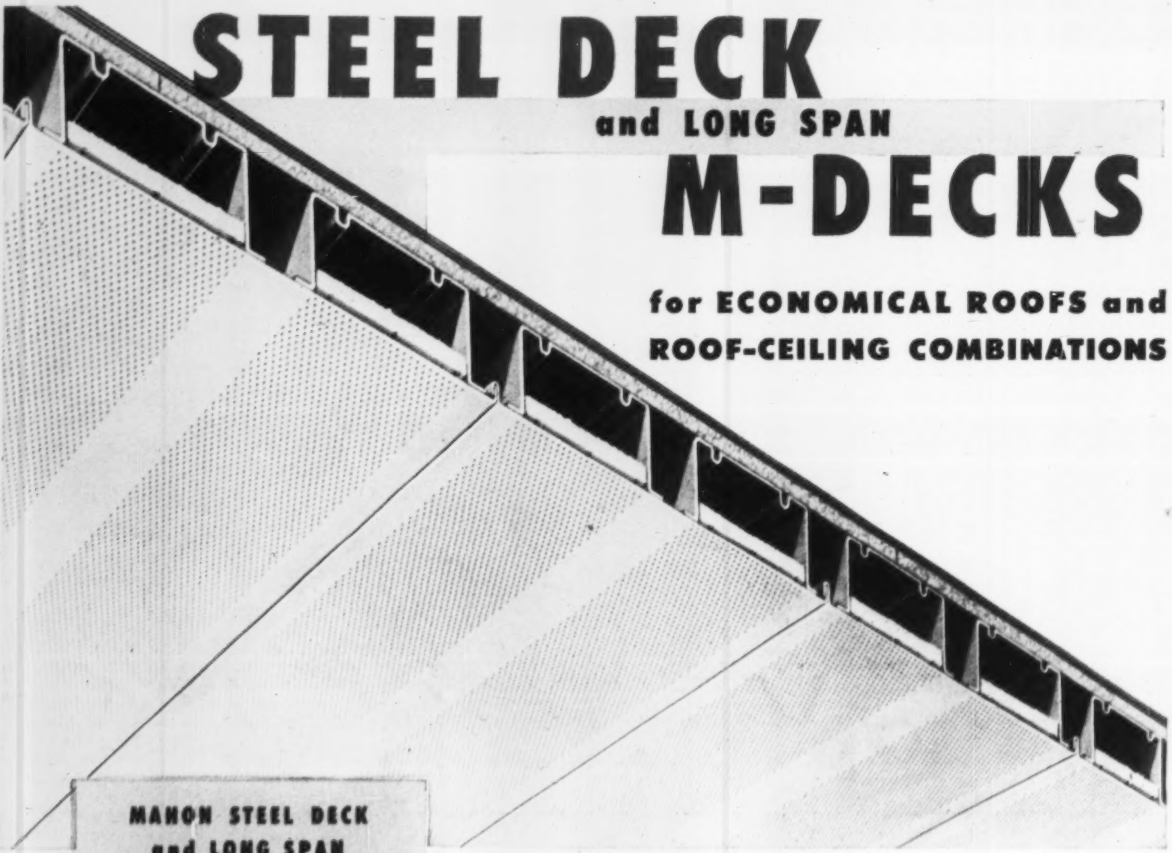
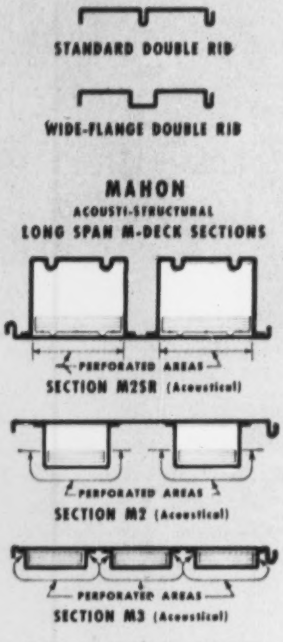


STEEL DECK and LONG SPAN M-DECKS

for ECONOMICAL ROOFS and ROOF-CEILING COMBINATIONS

MAHON STEEL DECK and LONG SPAN M-DECK SECTIONS



STANDARD DOUBLE RIB
WIDE-FLANGE DOUBLE RIB
MAHON
ACOUSTI-STRUCTURAL
LONG SPAN M-DECK SECTIONS
PERFORATED AREAS
SECTION M2SR (Acoustical)
PERFORATED AREAS
SECTION M2 (Acoustical)
PERFORATED AREAS
SECTION M3 (Acoustical)
PERFORATED AREAS
SECTION M3R (Acoustical)

M-DECKS Serve as the Structural Unit, the Interior Finish Material and Acoustical Treatment—all in One Package!

Mahon Long Span M-Deck Sections are ideal for roof construction in such structures as auditoriums, churches, armories, sports arenas and other buildings where rigid frame construction or exposed trusses are employed. M-Decks span from wall-to-wall or from truss-to-truss . . . no purlins are required. This arrangement produces a neat, continuous flat metal ceiling surface—all of which can be perforated and acoustically treated. If recessed lighting is desired, Mahon Troffer Sections can be included in this type of roof-ceiling construction in any ratio to meet specific lighting requirements. All Mahon Long Span M-Deck Sections can be furnished with bottom metal perforated and sound absorbing material inserted to provide an excellent acoustical ceiling . . . noise Reduction Coefficients range up to .85 in Mahon Sections recommended for this use. Mahon M-Deck Sections and Acoustical and Troffer Sections are roll-formed from Galvanized, Structural Quality Steel. Exposed surfaces in roof-ceiling construction can be readily painted to match or harmonize with any interior decor. Some of these Mahon Sections do not appear in the current Sweet's Files. Why not have a Mahon sales engineer call and bring you up to date on new Mahon products now available for Floor, Roof and Roof-Ceiling Construction.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

Sales-Engineering Offices in Detroit, New York and Chicago • Representatives in Principal Cities

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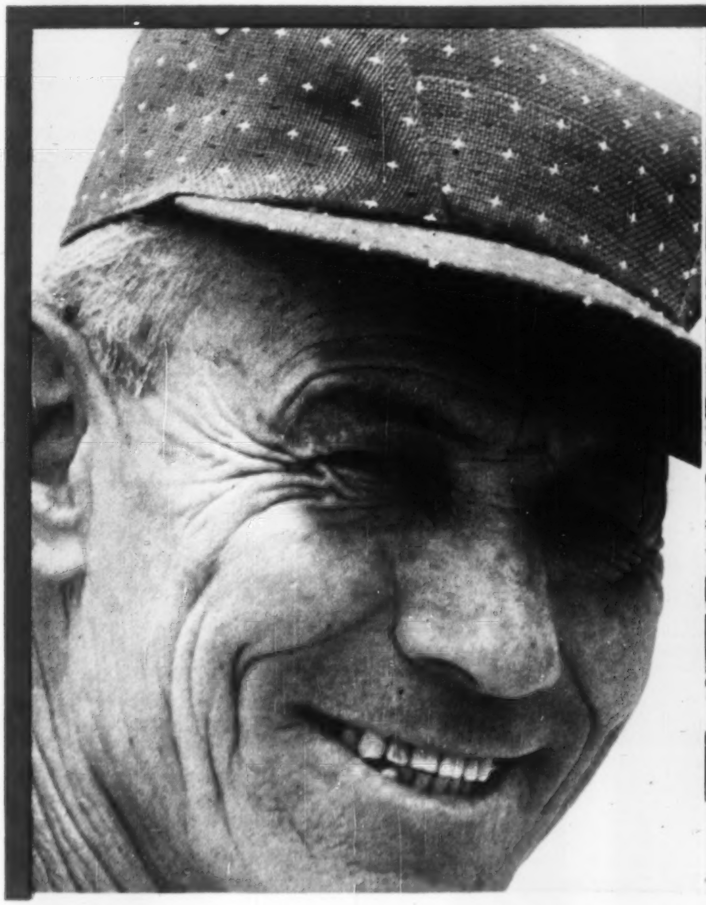
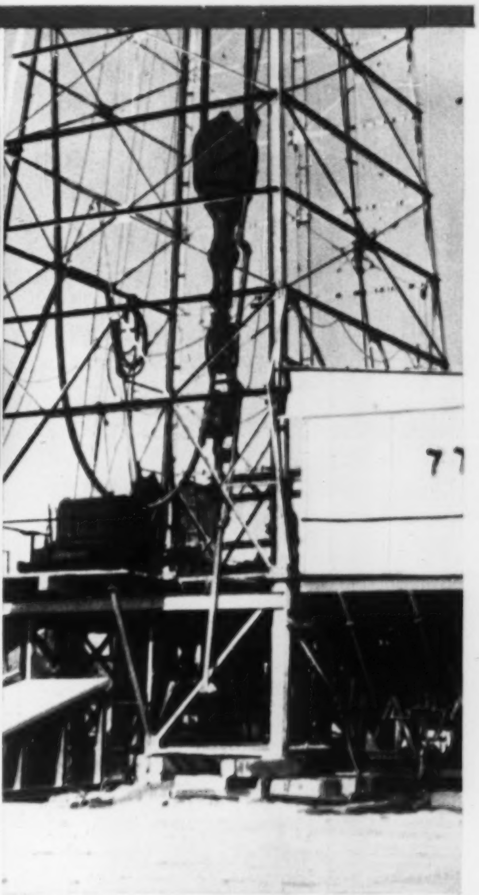
MAHON





A typical Murray drilling rig powered with 220-hp. LRO Waukesha and 230-hp. V-12 Le Roi engine.

How a steak dinner saved me $1,000 a day!

by L. D. Murray, Murray Drilling Co., Houston, Texas

"Engine failure due to overheating used to be a big problem when I was drilling in West Texas . . . downtime was costing me as much as $1,000 a day.

"Conditions were the worst I've ever encountered before or since. There were no prevailing winds to head the engines into. We were drilling 13,700-foot wells at an altitude of 4,200 feet and temperatures often ranged upwards of 100°. Consequently, our engines were constantly running well above the boiling point and at times they'd pull the mercury down to 9 or 10 inches. You can guess the rest . . . with expenses running about $25,000 a year on each of six engines, we were not exactly getting rich.

"Well, one day I told a friend of mine about my engine troubles, and he told me if I'd buy him a steak he'd solve my problems. So I bought him that steak (it was even big by Texas standards), and he told me to try Union's T5X Motor Oil . . . just that and nothing more. So before we'd finished lunch, I ordered five barrels of T5X sent out to the rigs.

"From that day on, our engine troubles were over. Water temperatures held at 190° and oil consumption dropped from 10 gallons to 1, sometimes even half-a-gallon per day. Instead of changing oil every Sunday morning, we found we could run T5X Motor Oil 500 hours, changing it and the filters every third or fourth Sunday. And would those engines deliver on T5X! If I had to shut one down for any reason, the other two would pull the load.

"To make a long story short those engines stayed on the line for three years after that, using only T5X, and the only expense aside from routine maintenance was an occasional tuneup. I think that Union T5X is so far ahead of any other motor oil, it's impossible to compare them."

What more can we add except to remind you that T5X, the *amazing* purple motor oil, is immediately available from your nearby Union Oil representative.

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offer your choice of impellers

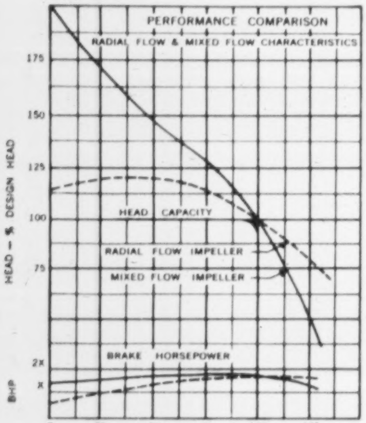
To meet a wide range of exacting pumping conditions, Verti-Line Close-Coupled Industrial Pumps are available with two impeller types.

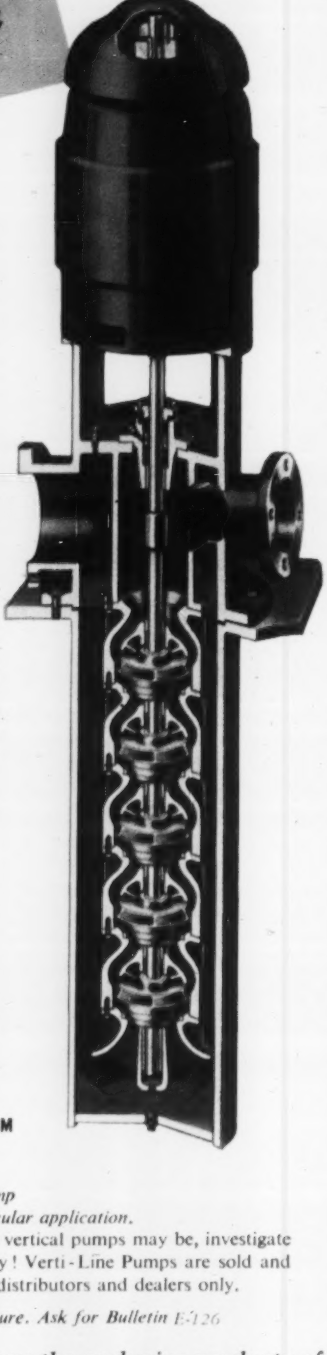
RADIAL-FLOW

The flat head capacity characteristic of the Radial-Flow impeller is applied to systems such as fueling, condensate return, and cooling towers, which operate at constant pressure against varying capacities and under throttled conditions.

MIXED-FLOW

The steep head-capacity characteristic of the Mixed-Flow impeller is applied where constant capacity is required at fluctuating pressures such as pipeline pumps or units operating in parallel or series.





CAPACITIES from 20 GPM to 30,000 GPM — HEADS to 600 PSI

There's a Verti-Line Pump designed to fit your particular application.
Whatever your needs for vertical pumps may be, investigate Verti-Line before you buy! Verti-Line Pumps are sold and serviced by independent distributors and dealers only.

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corporates more present day thinking toward the solution of the registration problems of the future." The Ideal Engineering Registration Law is the result, and it has now been distributed for discussion.

In announcing the Ideal Law, the NSPE committee said, "There is no intention of replacing anything now in existence. The 'Model Law,' which has been a fine guide for many years; the book, 'Professional Registration Laws'; the 'Synopsis of Engineering Registration Laws' compiled and published by NCSBEE (National Council of State Boards of Engineering Examiners) and kept current year by year; and the 'Suggested Standards' approved by the NCSBEE should still be used in planning for amendments to state laws." But it is also pointed out that "after final approval it (the Ideal Law) can (also) be used in writing amendments to state registration laws." The situation is that the Model Law, approved and endorsed by thirteen engineering societies including the NCSBEE, is still the recognized guide, with the Ideal Law being proposed as a more up-to-date version that is designed to meet "the registration problems of the future."

Wrong City

Sir—At this time, we wish to thank you for publishing the announcement of the formation of our partnership, on page 77 of the Nov. 8 issue of Engineering News-Record.

And, at this time we would like to bring to your attention that in the announcement it was stated that our headquarters were in Chicago, Ill. Our headquarters are located in Milwaukee, Wis., and we would greatly appreciate your efforts in printing this correction.

Nathan N. Solochek
Metcalfe-Solochek & Co.
Milwaukee, Wis.

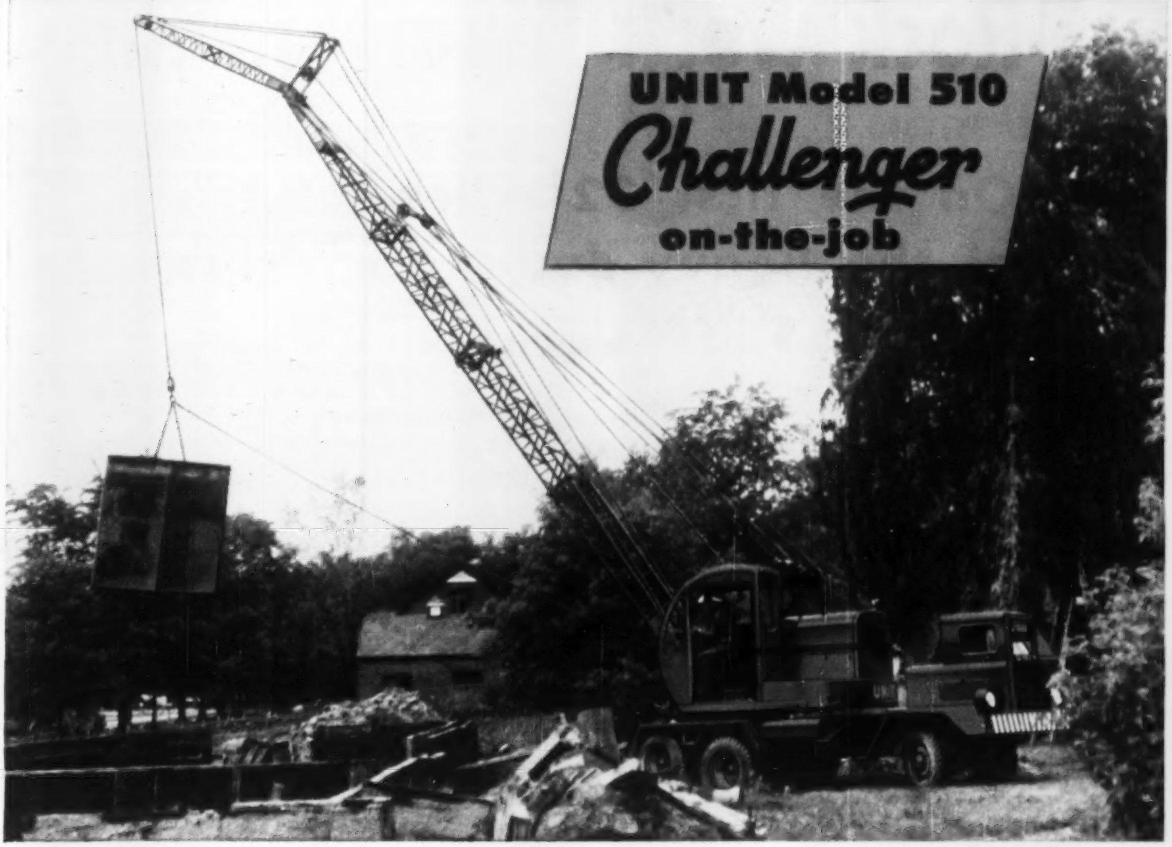
Too Many Construction Signs?

Sir—May a non-professional have a word with highway engineers?

Recently I have returned from a 6,000 mile auto trip and naturally we met with a lot of construction. Probably there is nothing less welcome to the tourist than a "Construction Ahead" sign. However, we all like the resulting pavement and don't complain too much.

Still we do begrudge the time and patience it takes to drive on construction and you highway people make it even harder for us with your misleading signs.

(Continued on page 24)



L-O-N-G *Reach, plus* LIFT *Ability!*

The UNIT Challenger comes in handy for *any* construction job, large or small. On the poured basement job shown above, for example, the Challenger has plenty of reach and lift ability for handling the heavy concrete forms. And it does the work quickly, efficiently and at low cost. Challenger features include: **One-piece cast main machinery case . . . Modern transmission design . . . Alloy steels and forgings . . . Involute splines . . . Force feed lubrication . . . Straight-in-line engine mounting . . . Hydraulic actuated clutches . . . Full floating, trunnion-mounted taper drums . . . Torque Converter . . . Safety-promoting, full vision cab . . . Full convertibility to all attachments.** Compare the Challenger, part for part, with any machine of its size and type. Then you will realize why it leads the field in design and performance. Bulletin C-800 gives all the facts.

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Please send me your new Bulletin on
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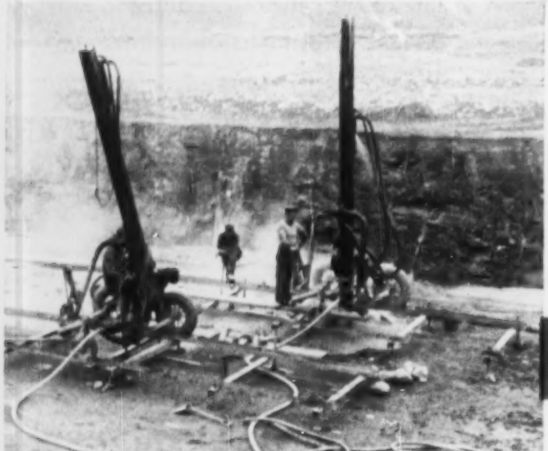
A 8547-1PC

Rock work report on the

On the first 32 miles, 69.1% of the heavy-duty rock drills are GARDNER-DENVER

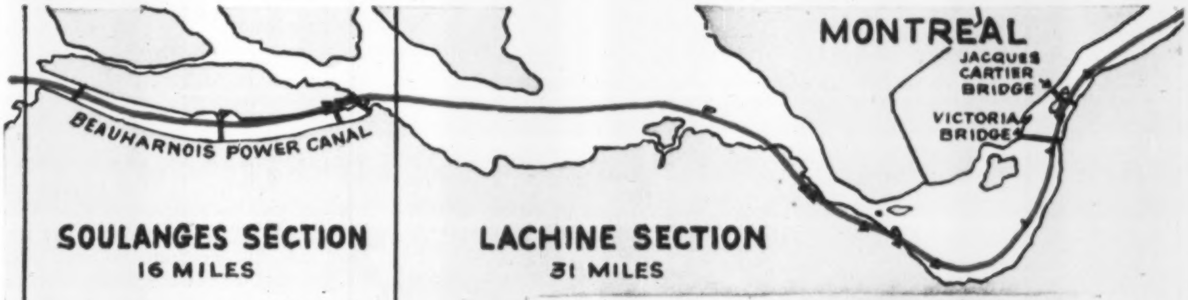
This contractor has 11 "Air Trac" Drills on the Beauharnois canal and lock project. Contract calls for 1.1 million cubic yards of rock removal.



Line drilling with Gardner-Denver Wagon Drills for excavating 7600 lineal feet of seaway channel between Jacques Cartier and Victoria bridges.

Rotary 600 . . . one of the 16 Gardner-Denver Portables on this stretch of the seaway. In use are Rotary 600's, Rotary 900's and piston-type portables.

St. Lawrence Seaway


MONTREAL
JACQUES CARTIER BRIDGE
VICTORIA BRIDGE
BEAUHARNOIS POWER CANAL
SOULANGES SECTION
16 MILES
LACHINE SECTION
31 MILES

▲ Approximate locations for contracts using a total of 47 Gardner-Denver rock drills.

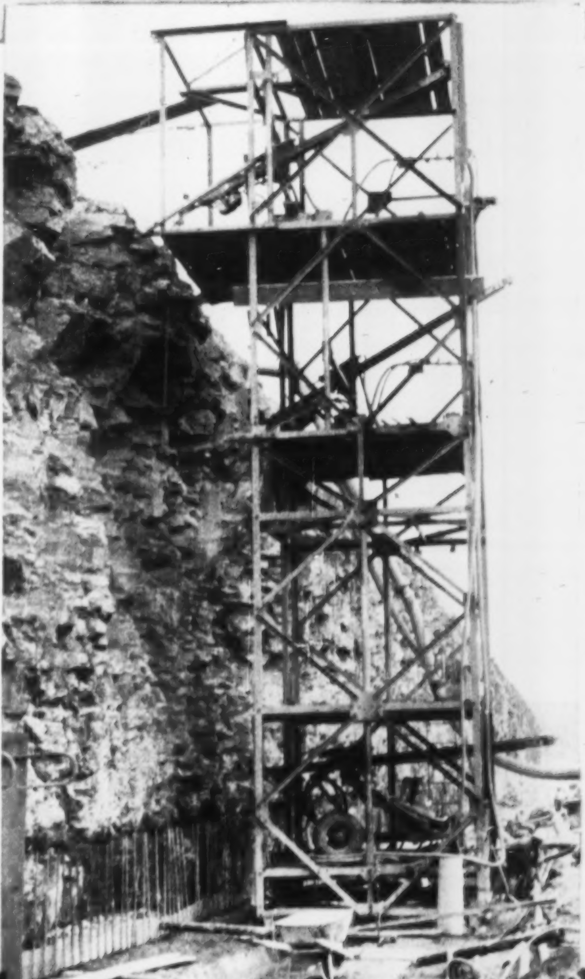
That's on the Lachine and Soulanges sections—where most of the heavy rock excavation is going on.

Here, ten contractors are using a total of 68 heavy-duty rock drills. 47 of these drills—or 69.1%—are Gardner-Denver. At work are:

- **25** Gardner-Denver "Air Trac"® Drills
- **18** Gardner-Denver Wagon Drills
- **4** Gardner-Denver Jumbo Drills

All these drills are equipped with Gardner-Denver steel—mostly with 600 Series ring seal shanks, sectional rods, couplings and bit adapters.

On the same stretch of seaway . . . 16 of the 24 portable air compressors are Gardner-Denver.



40-foot-high scaffold mounts three Gardner-Denver DH99J Drills on 10-foot RMC Feeds. Drilling 3-inch anchor bolt holes, 30 feet deep, for reinforcing rods.

GARDNER - DENVER

THE QUALITY LEADER IN COMPRESSORS, PUMPS, ROCK DRILLS AND AIR TOOLS
FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario

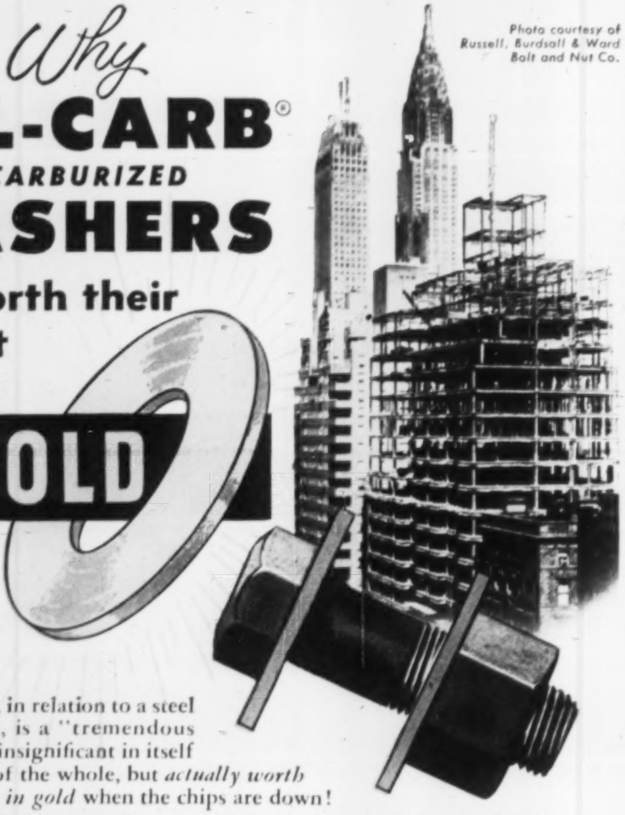


Photo courtesy of Russell, Burdsall & Ward Bolt and Nut Co.

Why MIL-CARB® CARBURIZED WASHERS are worth their weight in GOLD

A washer, in relation to a steel structure, is a "tremendous trifle" —insignificant in itself as a unit of the whole, but *actually worth its weight in gold* when the chips are down!

Today it is axiomatic that "no high strength bolt assembly is any better than its washers". Permanently tight, uniformly strong joining of steel members can be secured and maintained *only* if the washers carry their share of the load. On this basis a washer becomes a "tremendous trifle" — *worth its weight in gold!*

The danger of "washer failure" is reduced to a negligible minimum when MIL-CARB Carburized Washers are employed. MIL-CARB carburizing permits securing and holding desired tension. Nuts may be torqued up to specification maximums without danger of "galling" or grinding of the washer by the nut. In addition, MIL-CARB Washers are uniformly flat (of great importance, too).

In order to achieve maximum functional reliability, all MIL-CARB Washers are fabricated from Prime Carburizing Quality Special Soundness Steel, to insure uniform quality control at all times . . . always equal to rigid specifications (ASTM designation: A-325 applying to nuts, bolts and washers). The closely supervised carburizing process retains inner ductility of the metal, yet provides an exceptionally hard "outer skin" that successfully resists galling under the impact wrench.

Don't take chances with heat-treated washers fabricated from steel of possible questionable quality. For your own protection and as a guarantee of the unyielding permanence of your steel structures . . . specify *MIL-CARB Carburized Washers!*

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WROUGHT WASHER MANUFACTURING CO.
The World's Largest Producer of Washers
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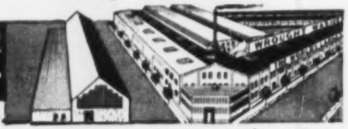


A 9034-⅓C

. . . Reader Comment

(Continued from page 20)

On our recent trip we frequently encountered signs which read:

SLOW CONSTRUCTION
25 Miles an Hour

and we would drive for a mile or more before we encountered the rough spots. By that time we may have let down our guard and come upon it unexpectedly. Sometimes such signs as "Men Working" are left up overnight or on weekends, when there are no men about. Once, late in the afternoon, we met a flagman diligently stopping and warning all cars, but we never did find the workmen. The crew must have gone home and forgotten him.

The most misleading and dangerous sign I found was one reading:

MEN WORKING
15 mph.

we drove for miles and met no workmen. Then came another large sign:

END OF CONSTRUCTION
THANK YOU

beside it was a small sign, which read "Men Working". These signs were on the blind side of a curve, and sure enough around the corner, men were working. I'd hate to have been one of them, for I felt that someone stood a good chance of being hurt.

Another potentially dangerous situation arose out of a panel truck which was covered with "Drive Carefully", "Safety Pays" and similar mottos. This car passed me on the highway and I had a good chance to read all the admonitions on its back and side. However, a few miles down the road I met it—parked and facing me. The truck being familiar and covered with signs, I almost missed the significant one on front: "Wide Load Following."

It is said, "One rose is more attractive than a dozen." Certainly one sign is more impressive than a dozen. I believe you would serve the cause of safety better by using fewer and more accurate signs.

(MRS.) M. G. BURLINGAME
Bozeman, Mont.

(Reader Comment continued on p. 38)

CALENDAR

Highway Research Board, annual meeting, Sheraton-Park Hotel, Washington, D. C., Jan. 7-11.

National Association of Home Builders, annual convention and exposition, Hotel Sherman, Hotel Conrad Hilton and Coliseum, Chicago, Ill., Jan. 20-24.

Associated Equipment Distributors, 38th annual meeting, Conrad Hilton Hotel, Chicago, Jan. 27-30.

American Road Builders Association, annual meeting and road show, Chicago Amphitheater, Jan. 28-Feb. 2.

TAX-CONSCIOUS COMMUNITIES

Specify CLAY PIPE for Economy

MENLO PARK SANITARY DISTRICT recently added more than 24,000 feet of Vitrified Clay Pipe sewers to serve the rapidly growing residential areas of San Mateo County, California. Since its founding, the District has installed approximately 150 miles of sewers.

District officials have been able to reduce tax rates consistently for the past several years, in spite of the national trend toward tax increases. Efficient operation is the key to this economy, and never-wear-out Clay Pipe plays an important part in keeping maintenance costs down. As District Superintendent Cedric Webster puts it: *"Since the sewers are of Clay Pipe, we do not believe that they will ever need to be replaced."*

DISTRICT OFFICIALS: Lawrence H. Cook, *Secretary of Board of Trustees and Acting District Engineer*
Cedric Webster, *Superintendent*
Frank Sasagawa, *Inspector*

CONTRACTOR: Pat Barkley Co.
John Coelho, *Foreman*

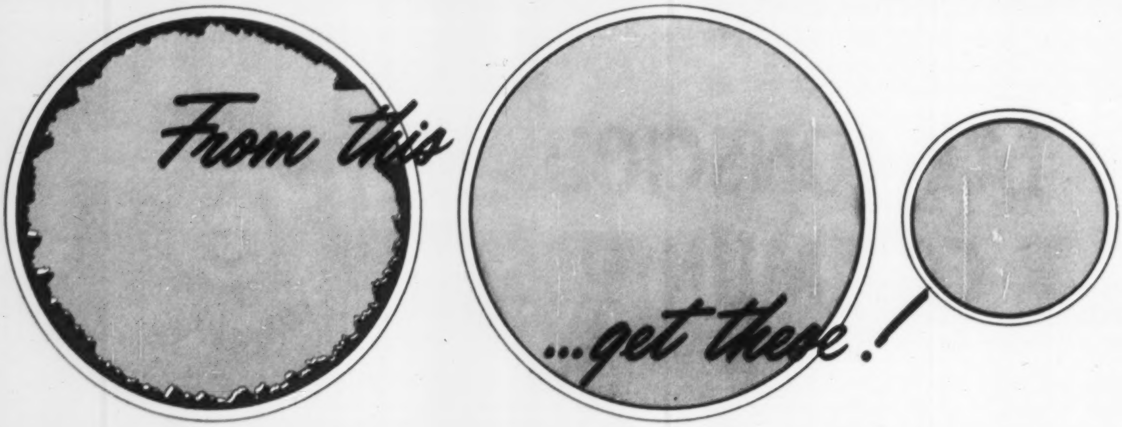
Vitrified
CLAY
CLAY PIPE NEVER WEARS OUT!
PIPE

NATIONAL CLAY PIPE MANUFACTURERS, INC.
1820 N. Street, N.W., Washington 6, D. C.

206 Connally Bldg., Atlanta 3, Ga.
100 N. LaSalle St., Rm. 2100, Chicago 2, Ill.
703 Ninth & Hill Bldg., Los Angeles 15, Calif.
311 High Long Bldg., 5 E. Long St., Columbus 15, Ohio

C-856-6

Progress in Public Health - Through Clay Pipe Research



MORE WATER...for your city, too

18% increased capacity with Cement Mortar Lining!

San Francisco arranged for Pipe Linings, Inc. to line 6 miles of the 44" Calaveras water line *"in place"* on a bonus penalty basis.

Bonus for high capacity, penalty for low capacity.

The cleaned 44" pipe, lined with cement mortar lining gave the City of San Francisco increased capacity...*increased capacity equivalent to adding a new 22" pipe line.*

This represented a *capacity* increase of 13,300,000 gallons per day.

Heres' how

Length Lined . . . 6 Miles
Contractor . . . Pipe Linings, Inc.
Capacity Increase . . . **18.1%**

Increased capacity was a prime consideration in reconditioning this line "in place."

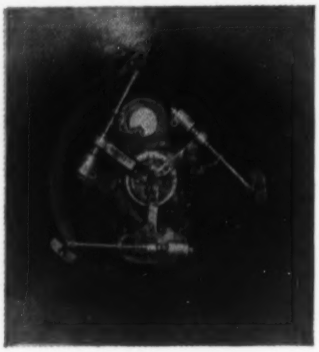
The terrain traversed by this line includes narrow canyon, creek crossings, short cuts over ridges, flatland and tunnel with pipe installed within. There were 298 horizontal and vertical bends ranging up to 30°.

Work on the contract began with the cleaning operations that required two passes with the hydraulic cleaning tool and were completed in 8 days. Lining operations were completed in 88 days elapsed time. Winching was required at five locations for lining aproximately 1250 feet of line where the grades were too steep for the lining machine to climb unaided. The average length of 44" pipe which was machine lined in a normal working day was 500 feet.

Prior to reconditioning the line the "C" value was 115.8. The actual increase in flow was 13.3 mgd equal to 18.1 percent which is approximately equivalent to the capacity of a 22 inch diameter line.

The total cost for cleaning and lining 30,415 feet of line was $153,386. Cost of installing a new 22" line (capacity gained) has been estimated at $672,760 . . . a saving of $419,374, or approximately 272% of the actual lining cost.

Cement mortar lining improves flow coefficients, reduces pumping and maintenance costs, prevents leakage, protects against corrosion. Let Pipe Linings, Inc. assist in your water capacity problems. Expert engineers are at your service.



Write for reprint of technical article covering the Calaveras job in detail. It appeared in one of the country's leading trade magazines. Write TODAY!

PIPE LININGS, Inc.

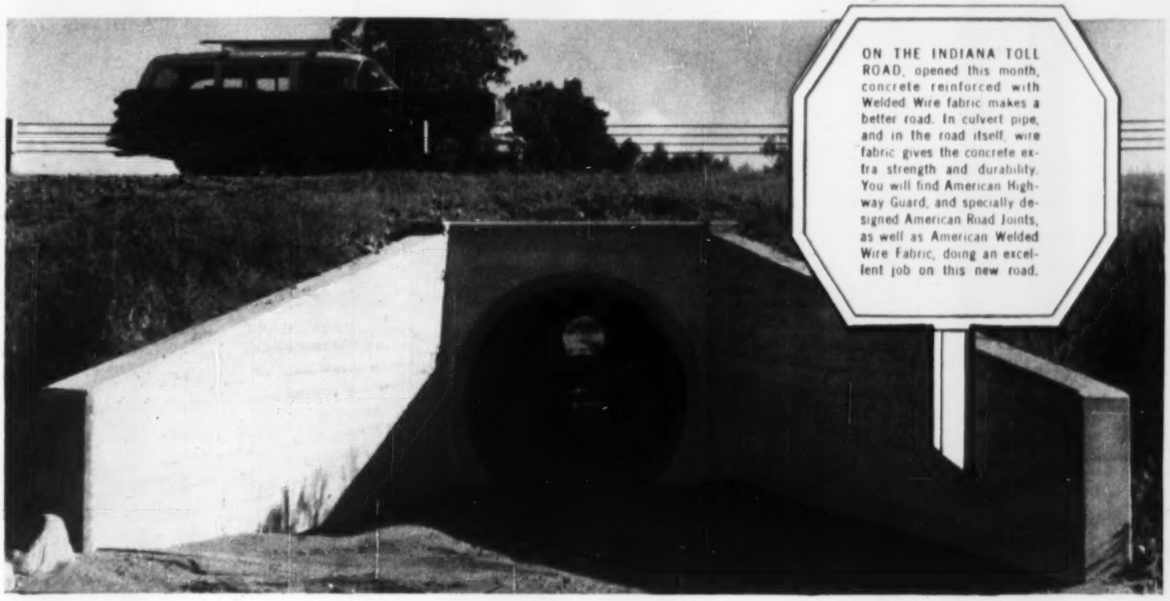
Specializing in Pipe Protection Problems • Interior Cement Mortar Lining • Somastic® Exterior Pipe Protection • Pipe Wrapping • Centrifugal Spinning of Cement Mortar Linings in Plant • Pipe Reclamation.

2414 East 223rd St., Wilmington, California
P. O. Box 457, Wilmington, California
Phone NEvada 6-1771 • Rail Address: Watson, California

Highly Stressed Concrete Lasts Longer

when reinforced with

American Welded Wire Fabric



ON THE INDIANA TOLL ROAD, opened this month, concrete reinforced with Welded Wire fabric makes a better road. In culvert pipe, and in the road itself, wire fabric gives the concrete extra strength and durability. You will find American Highway Guard, and specially designed American Road Joints, as well as American Welded Wire Fabric, doing an excellent job on this new road.

Concrete roads, floor slabs, pipe, walls, sidewalks—all are improved with Welded Wire Fabric reinforcement. They have greater resistance to cracking, last longer, and stay smoother. And now, for concrete that must withstand unusually high stresses, American Welded Wire Fabric comes in larger sizes than formerly. It's now available in diameters up to and including ½″, at 2″, 3″, 4″, and 6″ on center. It meets ASTM Specification A 185 56T.

The high quality of American Welded Wire Fabric is rigidly controlled from iron mine to you. Made from tough, cold-drawn steel . . . then electrically welded together into a strong network of durable reinforcement, it cuts maintenance cost because it increases service life of concrete. It cuts *installation* costs because it is easily handled and placed. It comes in both sheets and rolls. Send the coupon for helpful literature on this and other construction materials manufactured by American Steel & Wire.

AMERICAN STEEL & WIRE
DIVISION
UNITED STATES STEEL, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

IT PAYS TO ASK

"is it Reinforced"

USS American Welded Wire Fabric

UNITED STATES STEEL

FREE TECHNICAL DATA

American Steel & Wire
Dept. 56-C, Rockefeller Bldg.
Cleveland 13, Ohio

Please send complete information on the following products:

☐ American Welded Wire Fabric for Portland Cement Concrete
☐ American Welded Wire Fabric for Asphaltic Concrete
☐ American Welded Wire Fabric for Airport Runways
☐ American Wire and Strand for Prestressed Concrete
☐ American Road Joints
☐ Multisafty Highway Cable Guard
☐ American Beam-type Highway Guard
☐ Have your representative call

Name ....
Firm ....
Address ....
City .... State ....

Lima Crane with Twin Disc Single-Stage Torque Converter "...fastest thing we own"

says Ohio Contractor

"I've watched this machine carefully, and it is the fastest thing we own," says Assistant Project Engineer Jack Hickey, of Baker & Hickey, Columbus, Ohio, contracting firm. "This is the smoothest . . . too, especially on pile-driving operations. And I know the torque converter is absorbing those tremendous shocks."

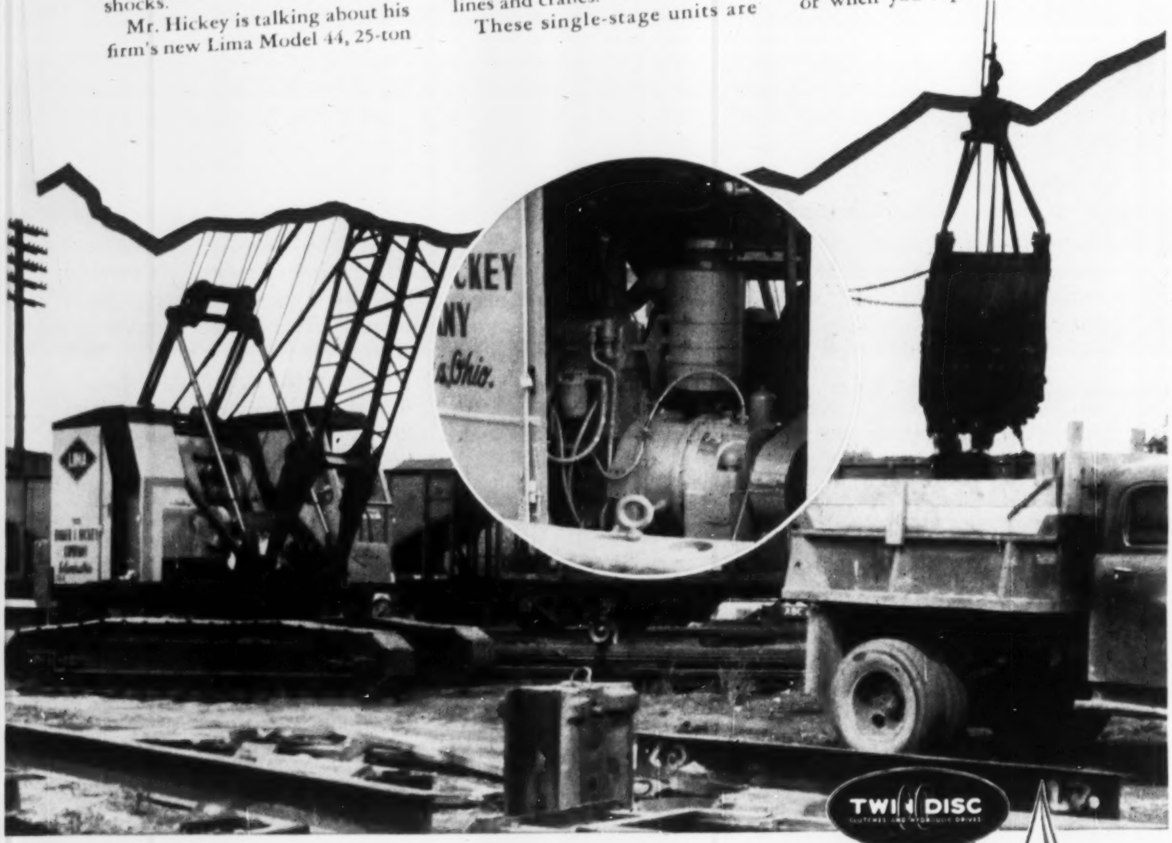
Mr. Hickey is talking about his firm's new Lima Model 44, 25-ton Crane equipped with one of the new Twin Disc 1500 Series Single-Stage Torque Converters . . . and the underpass and bridge construction work it is doing on the Columbus and Sandusky Expressway.

Like Baker & Hickey, more and more contractors are specifying Twin Disc Single-Stage Torque Converters in their shovels, draglines and cranes.

These single-stage units are designed expressly for just such work. They provide smooth torque multiplication to just the exact ratio required, and permit delicate "inching" or "holding" of loads under power.

Fluid connection cushions *out* damaging shock loads and vibrations, protecting *both* driving and driven equipment. The result is *reduced* maintenance costs, *extended* cable life, *increased* profits!

Specify Twin Disc Torque Converters for *your* new shovels or when you repower old ones.



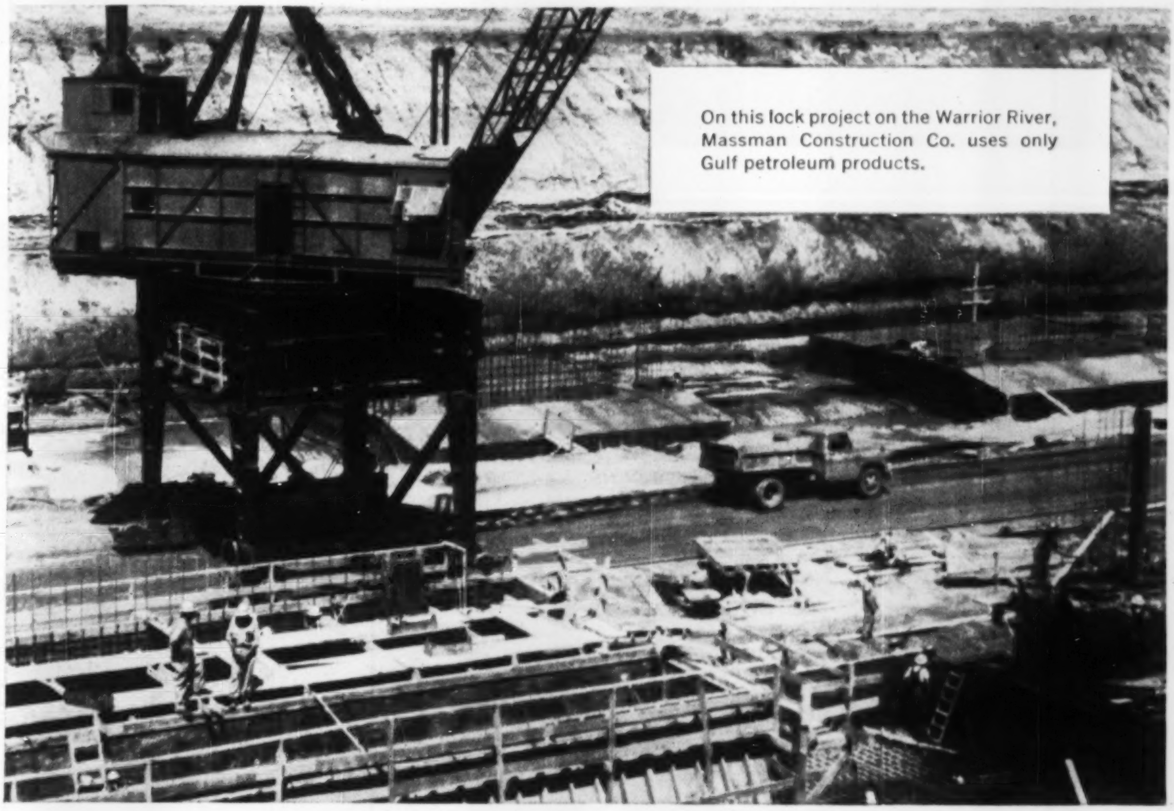
Left. Baker & Hickey's new Lima 25-ton Crane loading with a clamshell bucket at Columbus, Ohio. *Inset.* Powered by a Cummins JBIS Diesel Engine, the Lima Crane uses a Twin Disc Single-Stage Torque Converter to transmit power smoothly and efficiently.

Write today for full details on Twin Disc Torque Converters — both single-stage and three-stage.

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES

TWIN DISC
Torque Converters

Twin Disc Clutch Company, Hydraulic Division, Rockford, Illinois



On this lock project on the Warrior River, Massman Construction Co. uses only Gulf petroleum products.

GULF PRODUCTS and FINE SERVICE

keep equipment rolling on Warrior River Dam Project

Boats with large tows will be able to save considerable time in navigating from Birmingham, Alabama to the Gulf of Mexico when Massman Construction Co., Kansas City, Missouri completes this new lock on the Warrior River, Eutaw, Alabama.

To keep their equipment rolling and hold maintenance costs down, Massman Construction Co. uses Gulf petroleum products exclusively. Like hundreds of other leading contractors, they know they can always rely on Gulf for quality products, prompt delivery and technical advice when needed.

Fifteen hundred Gulf warehouses are ready and willing to serve *you,* too. If you'd like to know how, send now for your copy of the new booklet "Gulf and *Your* Business."

GULF

Gulf Oil Corporation • Gulf Refining Company
1822 Gulf Building, Pittsburgh 30, Penna.

Without any obligation on my part, send me a copy of the new booklet "Gulf and Your Business." ENR

NAME________________________

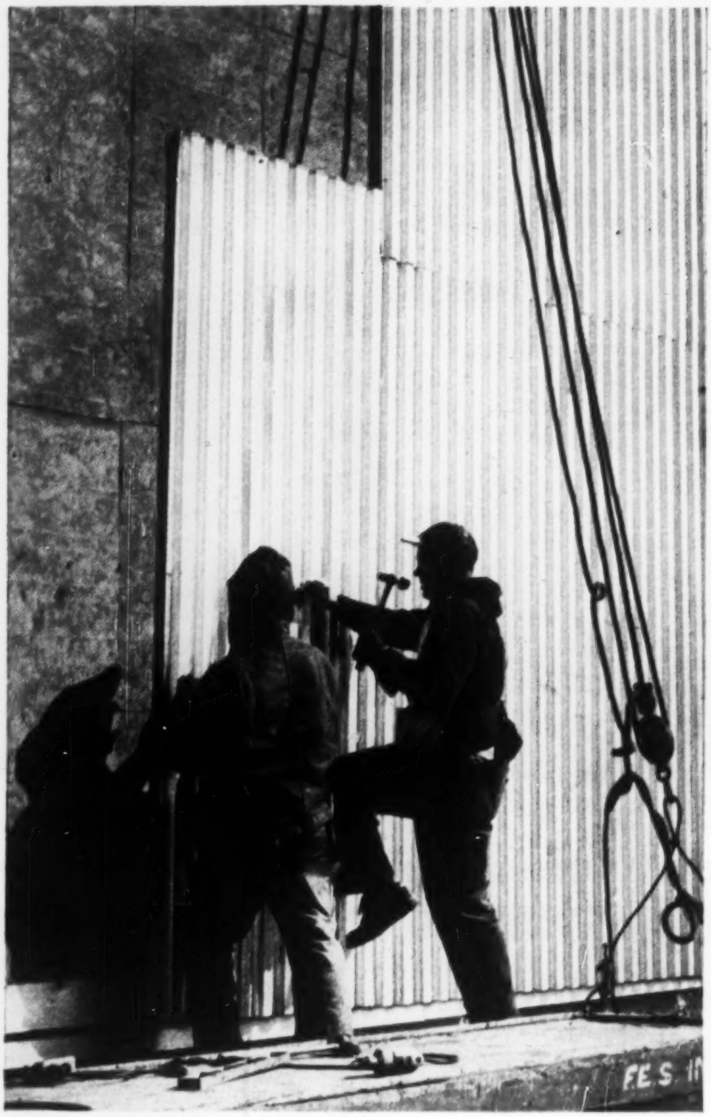
TITLE________________________

COMPANY________________________

CITY____________ZONE____STATE________

THE FINEST PETROLEUM PRODUCTS FOR ALL YOUR NEEDS

New sandwich wall goes up faster and the cost is low!



Here's a high-performance low-cost wall you'll want to know more about. It's the new Fiberglas* insulated aluminum sandwich wall, a joint promotion of the aluminum industry, Nelson Stud Welding Co. and Owens-Corning Fiberglas.

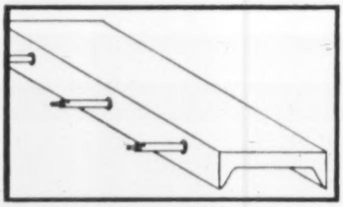
This new wall is made by sandwiching Fiberglas Insulation between two sheets of aluminum. It's quickly assembled on the site, costs only about $1.10 to $1.40 per square foot, and offers other advantages, besides . . .

THERMAL EFFICIENCY—The core of Fiberglas Insulation reduces air conditioning and heating requirements. Insulating efficiency (.15 "U" Factor) is three times the value of an 8″ masonry wall.

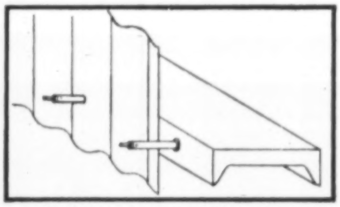
MAINTENANCE—Little or none is required. Both the aluminum sheathing and the Fiberglas Insulation are rust-proof, rot-proof, fire-safe and dimensionally stable.

DESIGN FLEXIBILITY—Standard Fiberglas PF Insulation and standard aluminum sheets are used. You get a custom-tailored building without paying for custom-tailored materials.

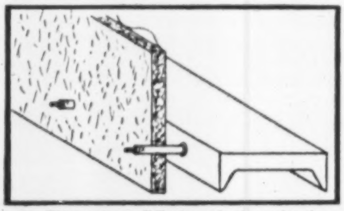
Advantages like these make the Fiberglas insulated aluminum sandwich wall perfectly suited for commercial and industrial buildings—for plants and warehouses of all types. For full details on this high-performance, low-cost wall, write today to Owens-Corning Fiberglas Corporation, Dept. 145G-5, Toledo 1, Ohio.



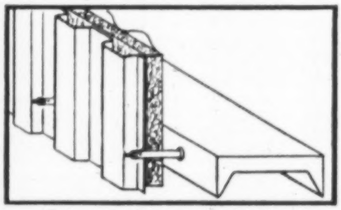
1 Nelson Rivweld Studs are automatically end welded to girts and purlins.



2 Interior corrugated aluminum sheet is impaled over major diameter of stud.



3 Fiberglas PF Insulation is impaled over stud extension and nested firmly against interior sheet.



4 Exterior aluminum sheet is impaled over stud extension and secured with SETLOK cap.

OWENS-CORNING
FIBERGLAS
T.M. REG. U.S. PAT. OFF.

*T.M. Reg. O-CF Corp.

Greenlee cuts steam costs 18%-20% burning coal the modern way

Consult an engineering firm

Designing and building hundreds of heating and power installations a year, qualified engineering firms can bring you the latest knowledge of fuel costs and equipment. If you are planning the construction of new heating or power facilities—or the remodeling of an existing installation—one of these concerns will work closely with your own engineering department to effect substantial savings not only in efficiency but in fuel economy over the years.

facts you should know about coal

In most industrial areas, bituminous coal is the lowest-cost fuel available • Up-to-date coal burning equipment can give you 10% to 40% more steam per dollar • Automatic coal and ash handling systems can cut your labor cost to a minimum. Coal is the safest fuel to store and use • No smoke or dust problems when coal is burned with modern equipment • Between America's vast coal reserves and mechanized coal production methods, you can count on coal being plentiful and its price remaining stable.

Expanding facilities at Greenlee Bros. & Company, Rockford, Illinois, created a problem common to many growing firms. The Company's three old boilers had to operate continually at maximum capacity, so that a forced outage could hurt plant production. In addition, peak load operation with outmoded equipment resulted in high fuel costs.

While the newest boiler was retained, Greenlee replaced the other two with modern high-capacity units, including stokers, up-to-date controls and other equipment for more efficient operation. A new, pneumatic ash handling system was installed. Today Greenlee is getting 10%-20% more steam for each pound of coal burned and steam costs are down 18%-20%, saving Greenlee thousands of dollars every year.

For further information or additional case histories showing how other plants have saved money burning coal, write to the address below.

BITUMINOUS COAL INSTITUTE
Southern Building • Washington 5, D. C.

There's a MADSEN ASPHALT PLANT ...for every BITUMINOUS MIXING NEED

Equipment that Serves®

- **MADSEN builds a complete line of batch capacity asphalt plants in sizes from 1000-lbs. per batch to 6000-lbs. per batch to meet every need of the small and the large contractor, highway departments and municipalities.**

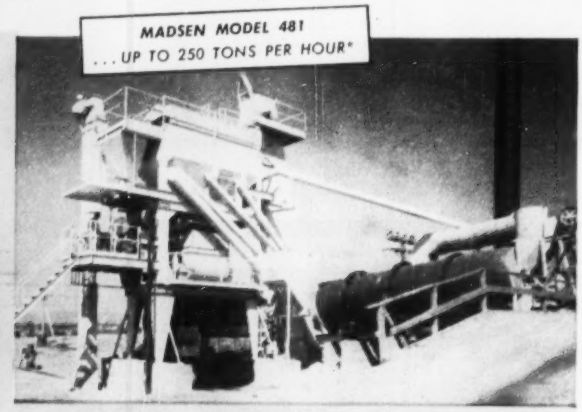
THE LITTLE MONSTER®
... 30 TONS PER HOUR*

A complete asphalt mixing plant on wheels. Designed for fast moving, fast set-up and substantial daily production. The "LITTLE MONSTER" shown is owned by a State Highway Department. Plant is complete including two MADSEN 32" x 10' Dryers, a MADSEN 2-compartment portable feed bunker, and dual cold stone elevators. Mixer unloading skip ... loads asphalt into trucks.

MADSEN 2000-LB. SPECIAL
480 TONS PER 8-HOUR DAY*

A small plant with big features. Plant shown is operated by a contractor in Oklahoma. Set-up includes a 60" x 28' MADSEN Dryer, a MADSEN Model 160 Dust Collector, a 30" x 10' Symons Screen, and a 35-ton, 2-compartment feed bunker with gravity flow to cold elevator (built by customer). Here's an ideal plant for handling those jobs up to the 10,000-ton class.

MADSEN MODEL 481
... UP TO 250 TONS PER HOUR*



This outstanding MADSEN plant is available in 4000-lb., 5000-lb. and 6000-lb. batch capacities. Plant shown is a 5000-lb. unit. It has an 84" x 32' MADSEN Dryer and a MADSEN 380 Dust Collector. Plant is equipped with dust elevator, bin and screw. Operator platform is located at end of plant which provides unobstructed view of in-coming and out-going trucks.

** These are rated capacities. For the complete story on MADSEN production records, see your MADSEN Distributor*

MADSEN has been building asphalt plants since 1914 (the oldest manufacturer of asphalt plants in the West). This manufacturing experience combined with MADSEN'S practical approach and solution to those in-the-field problems encountered on every bituminous mixing job ... results in a line of asphalt plants that you can always count on for superior performance. Plan now to put a MADSEN Asphalt Plant to work for you in 1957. See your MADSEN Distributor or write MADSEN WORKS, Baldwin-Lima-Hamilton Corporation, 14120 E. Rosecrans Ave., P. O. Box 38, La Mirada, California.

THE MADSEN LINE OF PRODUCTS
FOR THE ASPHALT PAVING INDUSTRY
INCLUDES

**ASPHALT PAVING PLANTS • PUG MILL MIXERS • AGGREGATE DRYERS • DUST COLLECTOR UNITS
ROAD PUG TRAVEL-MIX PLANTS • WEIGH BATCHERS • SUPER FLOAT AND JOHNSON FLOAT FINISHERS
ASPHALT TANKS • ROYAL CROWN PUMP VALVES • ASPHALT AND FUEL PUMP UNITS**

MADSEN WORKS
BALDWIN-LIMA-HAMILTON
CONSTRUCTION EQUIPMENT DIVISION
DIVISIONS: Austin-Western • Eddystone • Electronics & Instrumentation • Hamilton • Lima • Loewy-Hydropress • Madsen • Pelton • Standard Steel Works

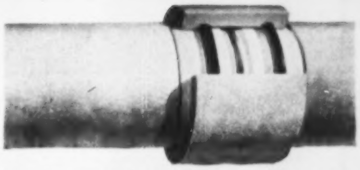
in
the main,
it's
money...

your tax money!

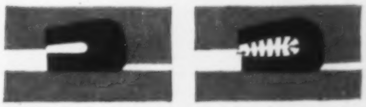
Non-tuberculating, non-corroding, non-electrolytic . . . these features of non-metallic K&M Asbestos-Cement Pressure Pipe mean low, stable pumping pressures and NO MAINTENANCE . . . Big tax savings for American communities!

But there are further tax savings in initial cost and installation with K&M Asbestos-Cement Pipe. It's light in weight, easily and inexpensively transported and handled. And K&M's EXCLUSIVE "Fluid-Tite" Coupling allows quick assembly under any weather conditions—*even with unskilled labor.*

Write today for complete information.



K & M "FLUID-TITE"® COUPLING



Compressible rubber rings allow easy pipe insertion.

Pressure expands rings. Higher pressure—tighter seal.

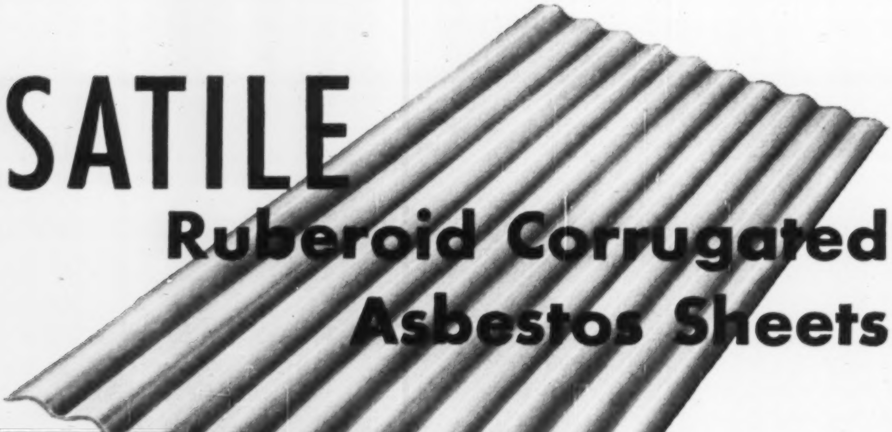
KEASBEY & MATTISON COMPANY • AMBLER • PENNSYLVANIA

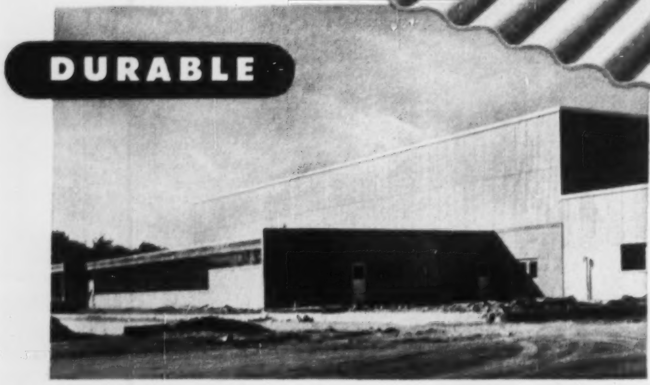
ENGINEERS WANTED — Career opportunities open for men qualified in product development, machine design, automation, plant management, plant engineering and applied research. Write to Director of Engineering, Keasbey & Mattison Company, Ambler 5, Pa.

K&M best in asbestos®

VERSATILE

Ruberoid Corrugated Asbestos Sheets





ECONOMICAL

DECORATIVE

Ruberoid Corrugated Asbestos combines durability . . . economy of installation . . . minimum upkeep . . . and unusual decorative possibilities – for many roofing and siding needs.

On the new Rock Of Ages Corp. plant in Barre, Vermont (upper left), these fireproof, noncorrosive sheets were selected to withstand severe climate changes, assure lasting durability in all weather. For the Shell Oil Co. Maintenance Shop #2 in Wood River, Illinois (center), Ruberoid Corrugated sheets made skeleton frame construction possible, required less costly footings. In addition to rugged, long life, Ruberoid Corrugated Asbestos can provide unusual decorative effects as in the Woodlawn Park Shopping Center, St. Petersburg, Florida (bottom).

Ruberoid Corrugated needs no paint to preserve it, requires virtually no maintenance over the years. It resists acids, fumes, smoke and steam, assures long life for any industrial or commercial use.

For more information, write:

The RUBEROID Co.

500 Fifth Avenue, New York 36, N. Y.

Delaware Extension to Pennsylvania Turnpike

New York Thruway

DRIVING MONOTUBE FOUNDATION PILES...

Familiar Sight

WHEREVER THERE'S CONSTRUCTION

Turner Turnpike, Oklahoma

New Jersey Turnpike

HERE'S a familiar sight on turnpikes and thruways throughout the Nation... tapered, fluted steel Monotube piles being easily driven by light standard cranes.

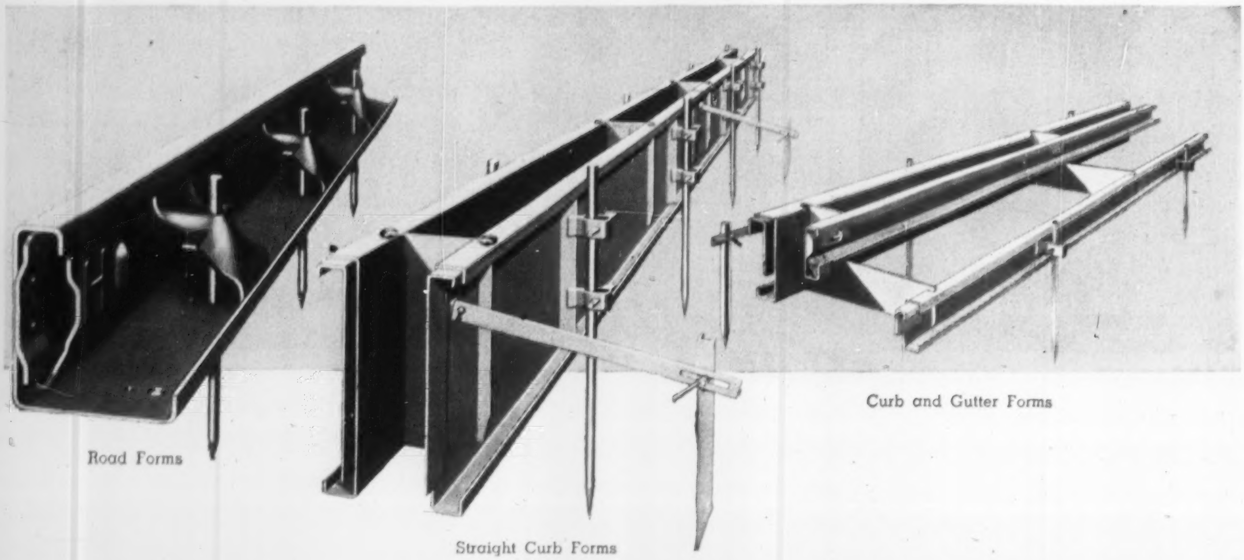
Monotubes have a reputation for making foundation jobs cost less, go faster. They are installed rapidly, without complications, because of their fluted design and light weight . . . with minimum hammer energy required to overcome weight inertia. Fluted and cold-rolled for added strength, Monotubes are also recognized for exceptional load bearing capacity.

On-the-job extendibility to virtually any required length, quick cut-offs and ease of handling are additional Monotube features that help builders and contractors save time and money on a wide range of foundation jobs. Write today to The Union Metal Manufacturing Company, Canton 5, Ohio.

UNION METAL

Monotube Foundation Piles

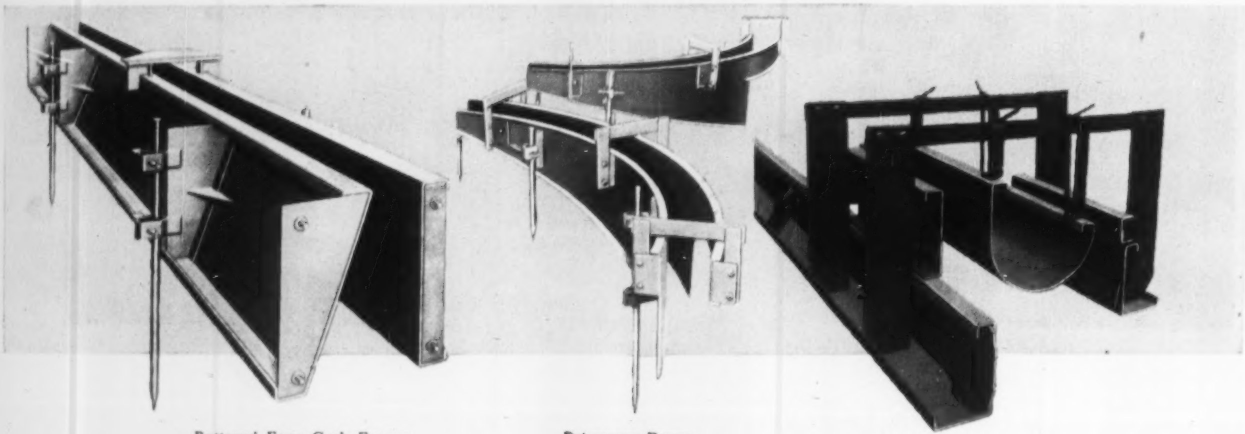
Form Engineering



Road Forms

Straight Curb Forms

Curb and Gutter Forms



Battered Face Curb Forms

Driveway Forms

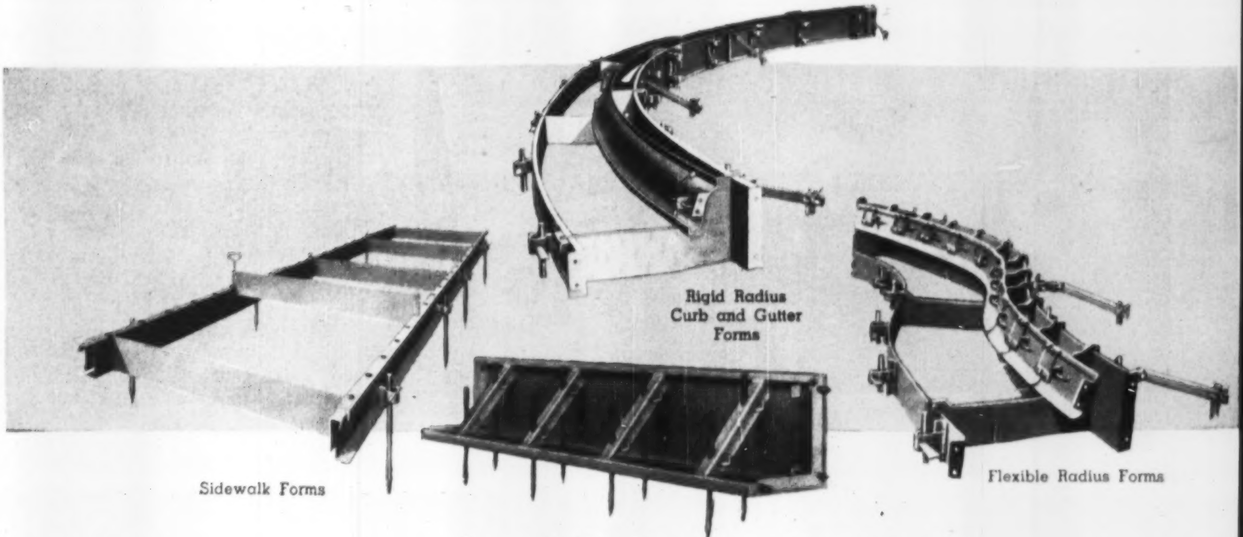
Special Forms

For 49 years, Heltzel has been supplying leading construction firms with the industry's finest engineered forms for the widest range of application.

It is this broad experience that enables Heltzel to better engineer steel forms for any specific requirement. And, because Heltzel engineers are always searching for better forming methods, you can always be certain you're getting the most up-to-date equipment when you specify "Forms by Heltzel."

When next you're in the market for forms, standard or special, write direct or contact the Heltzel representative in your area. He carries many of the more popular styles and types in stock.

Never Stops At Heltzel

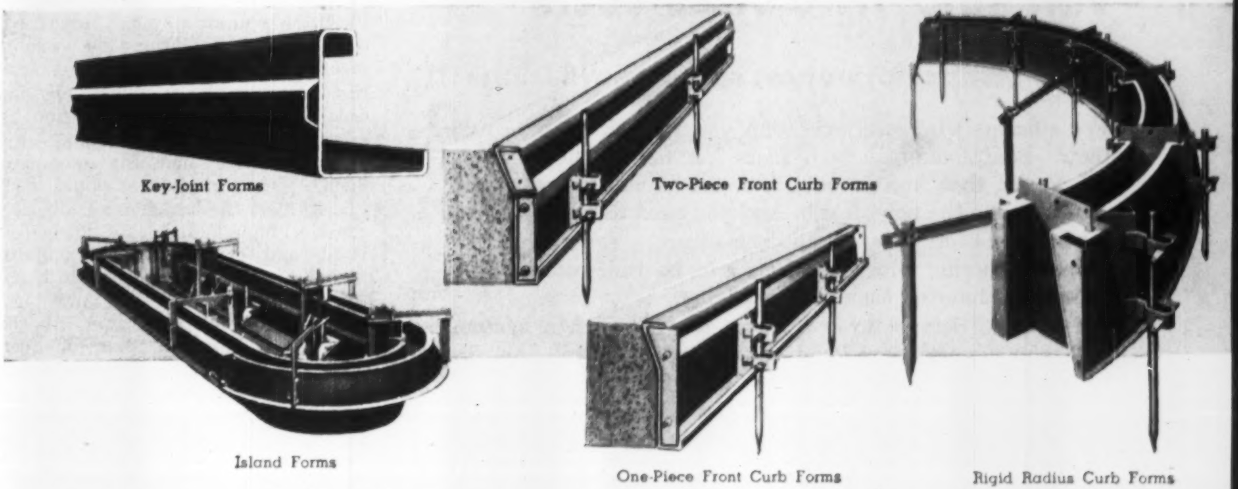


Rigid Radius Curb and Gutter Forms

Sidewalk Forms

Flexible Radius Forms

Dual-Duty Forms



Key-Joint Forms

Two-Piece Front Curb Forms

Island Forms

One-Piece Front Curb Forms

Rigid Radius Curb Forms

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FOR YOUR FILES

Handy form booklets from which you will be able to select the exact form for any job need. Write today for your copies.

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STEEL FORMS

THE HELTZEL STEEL FORM and IRON COMPANY
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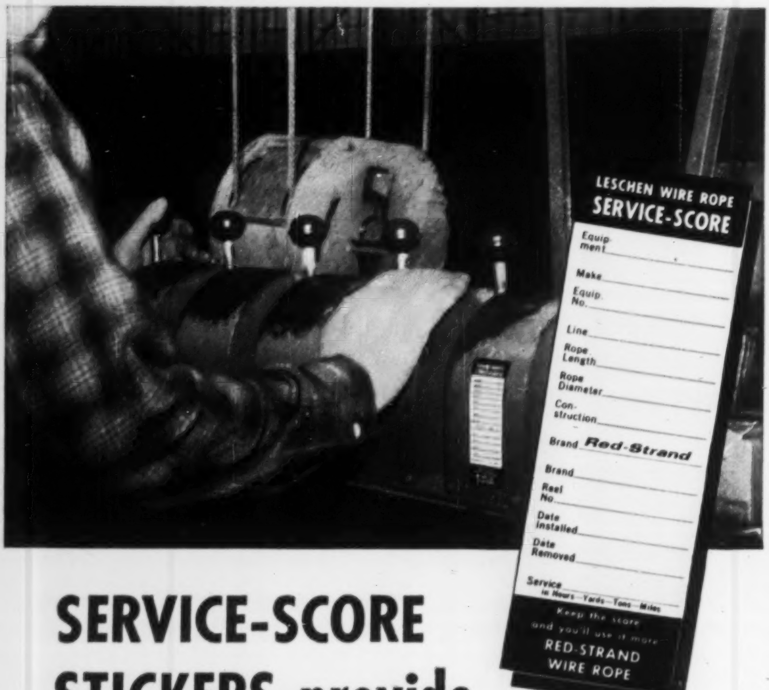


SERVICE-SCORE STICKERS provide valuable wire rope facts

...to test performance, speed reordering

For efficient wire rope operation you must have wire rope facts—brief, handy, accurate facts. You need them for safety (when did that line go on?). You need them for reordering (what size is the hoist line?). And you need them most of all for figuring cost (how long did it last?).

But gathering wire rope facts can be time-consuming—unless you have an easy, simple system.

Leschen's Service-Score Stickers provide such a system. The facts are always at hand—on the machine while the wire rope is working, and in the record book from then on.

Service-Score Stickers make it easy to compare the service you get from various rope constructions, types, and brands, so you *know which one is best* for you.

With the Service-Score System you prove to yourself that Red-Strand wire rope consistently exceeds industry standards for strength and safety.

Write for your starting supply of Service-Score Stickers now—or see your Leschen distributor.

LESCHEN
Red-Strand
WIRE ROPE

HKP
A DIVISION OF H. K. PORTER COMPANY, INC.

Keep the score and you'll use it more
Red-Strand Wire Rope

LESCHEN WIRE ROPE DIVISION
H. K. PORTER COMPANY, INC.
St. Louis 12, Missouri

Salaries

Sir—In the Nov. 8 issue on p. 17, reference is made to the comparative starting salaries of 1956 and 1936 engineering graduates. There is no question about salaries having "quadrupled while the Cost of Living Index has but doubled," although in an urban area you may get some rebuttal on the cost of living.

However, the comparison loses some of its effectiveness when one compares, or rather contrasts, the economic conditions prevailing at both ends of the 1935-1956 period. Everyone is aware of the high point of the present economy in which "unemployment" is virtually a forgotten word. Many of us still remember that period of major unemployment from 1928-1929, when the majority of "jobs" held by engineers were fortunate hand-outs of our government at $25 to $75 per week for men who previously had been earning $5,000 to $15,000 per year! Graduates were lucky to obtain any professional jobs at all.

It seems to me a more equitable basis of comparison would be to use salary figures prevailing back in 1929 before the crash. Or, if you must use the 1936 figures, why not adjust for commensurate conditions by visualizing the prevalence of a serious reaction which would be followed by the usual business cycle of reduction in sales, production, construction, etc., to the point of increasing unemployment? Then the graduate would again have to beat the bushes for a job, and consider himself fortunate to be offered, and glad to accept, half of prevailing salaries.

That would indeed be a more practical method of comparison. If the present budding generation of graduates could be impressed with such contrasting conditions, they might then be content with accepting graciously, and with thankfulness, the current salaries, and cost of living, and all the modern conveniences now taken for granted.

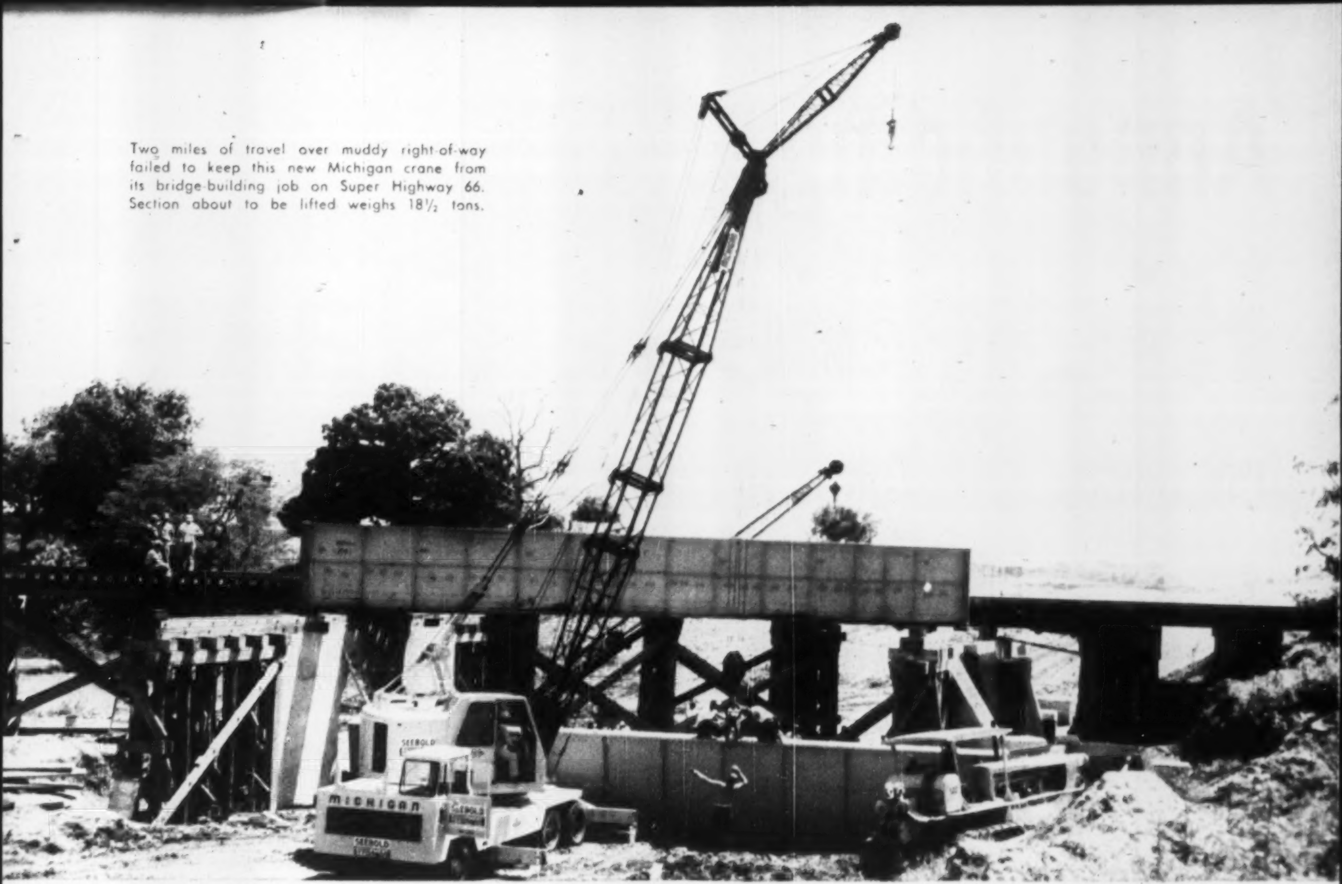
Benjamin Kamrass
Consoer, Townsend and Associates
Chicago, Ill.

Engineer Manpower

Sir—ENR's special report of Nov. 8 on "The Engineer Shortage" is, I believe, a real contribution to the profession, especially the civil engineering component.

There will not be agreement on all the conclusions derived from the study, although I personally have found noth-

(Continued on page 46)



Two miles of travel over muddy right-of-way failed to keep this new Michigan crane from its bridge-building job on Super Highway 66. Section about to be lifted weighs 18½ tons.

6 x 6 drive, big tires, all-Clark power-train standard

New Michigan truck-crane goes anywhere to handle lifts up to 25 tons

Like the owner pictured, your job requirements may, take your cranes through some pretty tough going. It's not always easy . . . not even for the all-new 25-ton Michigan Model T-24 truck crane. However, this unit is probably *better equipped* for rugged going than any other.

MICHIGAN
ALL TRUCKS
MUST PASS OVER
SCALES
1000 FT AHEAD

For highway travel, the new Michigan Model T-24 quickly strips to 41,500 lbs. gvw, well within weight limitations. All you do is remove counterweight, rear outrigger under power, then unpin boom. All wheel air brakes, power steer, vision through 2,775 sq. in. of safety-glass window make top speed of 39 mph absolutely safe.

Speeds from 1.6 to 39.0 mph

It gives you, as standard equipment, all-wheel 6 x 6 drive. It rides on 11.00 x 20, 12-ply high-flotation, high-traction tires. For travel through spongy or sandy footing, it has a low, low speed of 1.6 mph. It can go almost anywhere.

Frame all-Manten steel

It can work almost anywhere, too. Its truck frame is built of high-strength Manten alloy steel to stand up under the shocks and strains of heavy-duty service. Side-channels and cross-members are deep-penetrated submerged-arc-welded into a rugged integral unit. The truck alone weighs 27,000 lbs. Clark planetary wheel axles are standard, too, both front and rear. These axles, the result of over 50 years experience by Clark in the design and manufacture of heavy-duty axles, provide a 3-to-1 reduction in the wheel hubs. This reduces axle torque by 70%, eliminating axle breakage. Static load rating of the tandem rear axle is 90,000 lbs.! Static load rating of the front steering drive axle is 30,000 lbs.!

Call us for all the facts

This new time-saving, go-anywhere truck crane is now available. Talk to your local Michigan Distributor about it. He can put one on your job under the popular Clark Lease-Purchase Plan, without your paying a penny down.

Michigan is a registered trade-mark of

CLARK EQUIPMENT COMPANY
Construction Machinery Division
2401 Pipestone Road
Benton Harbor 45, Michigan

CLARK®
EQUIPMENT

Announcing...
High Test Flake

COLUMBIA CALCIUM CHLORIDE

Now ready for your use in all types of concrete construction

Columbia HIGH TEST FLAKE Calcium Chloride which tests 95-98% $CaCl_2$ is now being shipped from the Barberton, Ohio plant.

This new HIGH TEST FLAKE production is in addition to Columbia's Regular Flake.

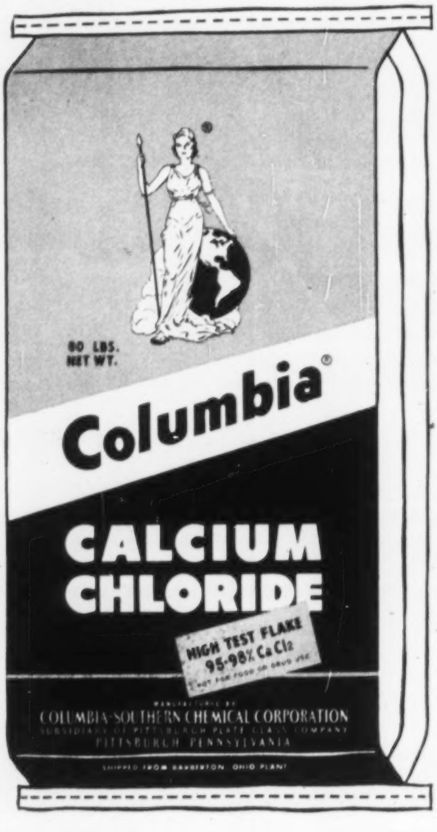
Columbia's HIGH TEST FLAKE Calcium Chloride has approximately 20% higher calcium chloride content than Regular Flake. An 80 pound bag of HIGH TEST FLAKE does the job of 100 pounds of Regular Flake. This higher concentration results in (1) smaller tonnages for you to handle, and (2) freight savings due to the higher calcium chloride content by weight.

Now, for the first time, Columbia-Southern offers $CaCl_2$ users a convenient, easy to handle 80 pound bag.

Contact your Columbia supplier or your nearest district sales office for prompt delivery on your HIGH TEST or REGULAR FLAKE calcium chloride requirements.

Use Columbia Calcium Chloride for better, stronger concrete faster!

These are the advantages you get by using Columbia Calcium Chloride in your concrete mix: Quicker set . . . Higher early strength . . . Greater ultimate strength . . . Better curing . . . Faster form removal . . . Reduced overtime . . . Earlier completion of the construction schedule.


80 LBS.
NET WT.
Columbia®
CALCIUM
CHLORIDE
HIGH TEST FLAKE
95-98% Ca Cl2
NOT FOR FOOD OR DRUG USE
MANUFACTURED BY
COLUMBIA-SOUTHERN CHEMICAL CORPORATION
SUBSIDIARY OF PITTSBURGH PLATE GLASS COMPANY
PITTSBURGH PENNSYLVANIA
SHIPPED FROM BARBERTON OHIO PLANT

Write today for more information on Columbia Calcium Chloride for concrete curing

**COLUMBIA-SOUTHERN
CHEMICAL CORPORATION**
SUBSIDIARY OF PITTSBURGH PLATE GLASS COMPANY
ONE GATEWAY CENTER · PITTSBURGH 22 · PENNSYLVANIA

DISTRICT OFFICES: Cincinnati · Charlotte · Chicago · Cleveland · Boston New York · St. Louis · Minneapolis · New Orleans · Dallas · Houston Pittsburgh · Philadelphia · San Francisco
IN CANADA: Standard Chemical Limited and its Commercial Chemicals Division

STANG SETS A WELLPOINT RECORD

Note shovel marks next to concrete weight in foreground of photo. This clearly indicates how well the earth is stabilized —no sloughing—no extra hand work required.

2300 FEET OF 30 - INCH PIPELINE

laid in one day!

Visualize more than a mile of header pipe with sufficient Stang Wellpoints to lower ground water level from 6 to 15 feet below subgrade *in 2000 foot sections.* That approximates the amount of dewatering equipment that Stang utilized in order to maintain a 1650 foot daily average (with a single-day high of 2300 feet) for the first two weeks on the job—amidst almost constant rainfall.

This 150 miles of 30-inch natural gas pipeline through southern British Columbia is being laid for the Pacific Northwest Pipeline Corporation by Sparling-Davis Co., Ltd. of Canada. In order to complete the 24 miles of dewatering required on the job within approximately 60 working days Stang field engineers contemplate stepping up the working schedule sufficiently to end up with a 2000 foot daily pipeline installation average for the entire job. Don't slow down your production because of groundwater—use Stang Wellpoints and engineering services to protect your job profits!

Putting water in its place

STANG

...anyplace!

WRITE FOR BULLETIN 100-A,

JOHN W. STANG CORPORATION

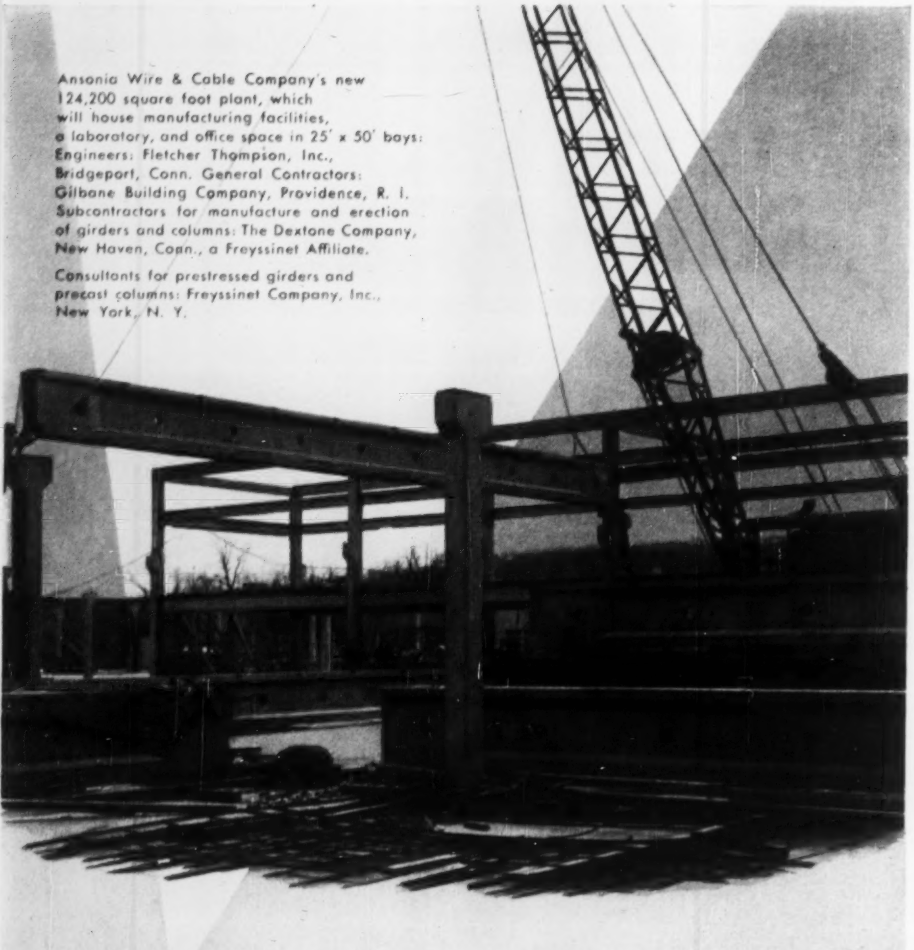
Engineers and Manufacturers of Dewatering Equipment, Wellpoint and Pumping Systems
Dewatering Planning—Equipment—Service

BELL, CALIFORNIA
8221 Atlantic Avenue
Telephone: LUdlow 2-7421

OMAHA, NEBRASKA
2123 South 56th Street
Telephone: Walnut 7796

TACOMA, WASHINGTON
2339 Lincoln Avenue
Telephone: Broadway 4362

TULSA, OKLAHOMA
4026 South Urbana Street
Telephone: Riverside 2-6929



Ansonia Wire & Cable Company's new 124,200 square foot plant, which will house manufacturing facilities, a laboratory, and office space in 25′ x 50′ bays: Engineers: Fletcher Thompson, Inc., Bridgeport, Conn. General Contractors: Gilbane Building Company, Providence, R. I. Subcontractors for manufacture and erection of girders and columns: The Dextone Company, New Haven, Conn., a Freyssinet Affiliate.

Consultants for prestressed girders and precast columns: Freyssinet Company, Inc., New York, N. Y.

For **FAST** *Construction of Industrial Buildings . . .*

use prestressed concrete

The Ansonia Wire & Cable Company's new manufacturing plant in Providence, R. I., proves prestressed concrete's advantages over other building methods. Fast erection was a prime requirement on this job—along with modern design and high quality—and only by using prestressed girders, precast columns, and "tilt-up" walls could demanding specifications be met and the bid still be competitive.

There were other important features of the Ansonia Wire & Cable structure significant to industrial plant builders:

- 50′ prestressed concrete girders with 6″ holes provided for present and future service lines. These girders were standard Freyssinet I-Beams.
- girders and precast columns were designed to carry a two-ton concentrated load in addition to the metal deck and ordinary roof loading.
- girders met 5,000 psi specifications and columns 3,750 psi.
- lower insurance rates because of greater fire resistance.

Only experts can provide prestressed concrete quality. Such experts are the Freyssinet Affiliates—each of whom operates a product plant equipped to manufacture *any type or size* of concrete structural unit on universal pretensioning beds. Highest standards of design and quality control during production are assured because each Affiliate retains skilled Freyssinet engineers, who have trained those responsible for producing quality precast products.

Engineers, owners and architects are invited to call the nearest Freyssinet Affiliate, whose sales engineering staff will analyze their job for fast, economical construction in prestressed concrete.

FREYSSINET AFFILIATES

The Dextone Company
166 Chapel Street
New Haven, Conn.

•

Goodstone Manufacturing Co., Inc.
470 Hollenbeck Street
Rochester, N. Y.

•

Formigli Corporation
2050 Locust Street
Philadelphia, Pa.

•

Economy Cast Stone Co.
15 East Franklin Street
Richmond, Virginia

•

Ready-to-Pour Concrete Co.
P.O. Box 1075
Idaho Falls, Idaho

•

Empire Prestressed Concrete of Oregon
9255 N.E. Halsey Street
Portland, Oregon

•

Precrete, Inc.
130-01 Northern Boulevard
Corona, N. Y.

•

Lewis Manufacturing Co.
3044 S.W. 28th Lane
Miami, Florida

•

Precast Concrete Limited
P.O. Box 398
Calgary, Alberta, Canada

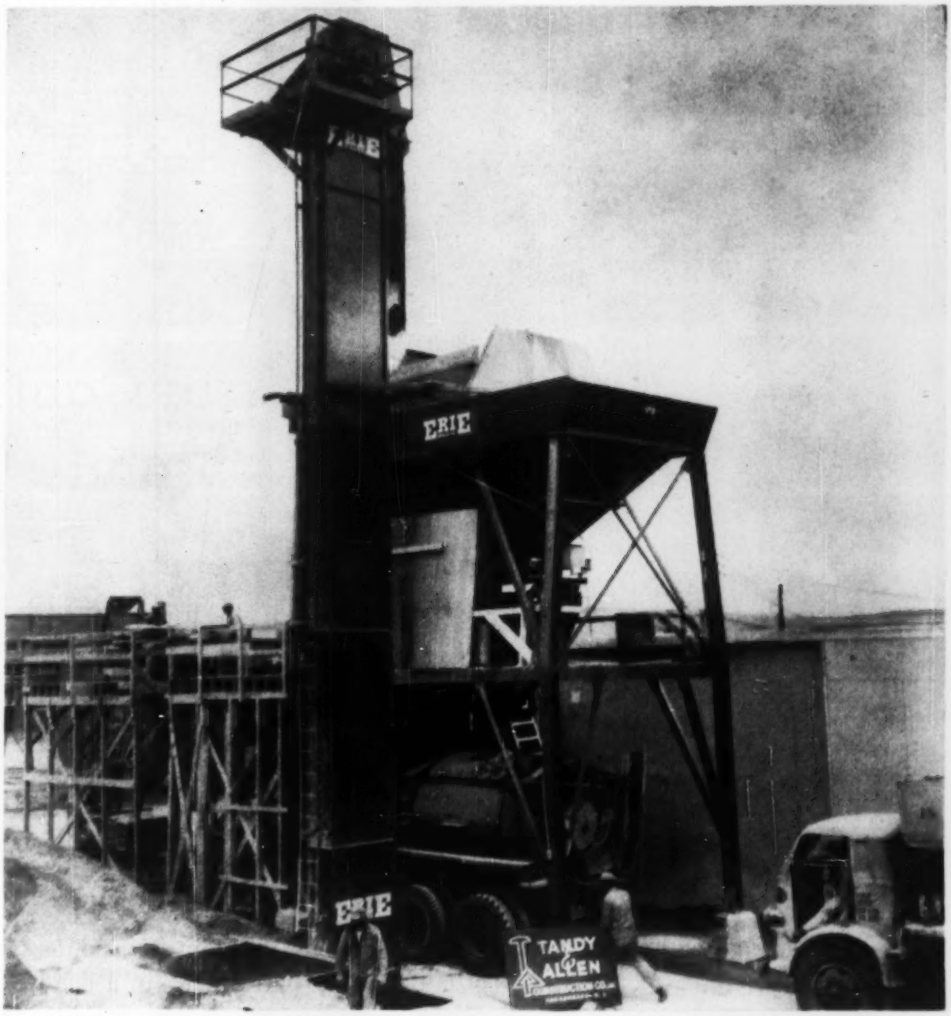
•

Schell Industries Limited
Woodstock
Ontario, Canada

•

Pretens, Inc.
Avenida Labra 800
Santurce, Puerto Rico

ERIE PORTABLE TRUCK MIXER PLANT SPEEDS COMPLETION OF NEW AIR BASE



Tandy & Allen's manually operated ERIE truck mixer plant is a P3-50A Combination Bin; equipped with AB3R 2 cu. yd. Aggregate Batcher having beam scales; EAC 17-75, 75 T. P. H. Capacity Aggregate Elevator; 8' x 8' Truck Hopper and Ladder; 10 H.P. Motor; and Swivel Distributor

"MAKE IT QUICK, but make it good. This job is needed not only for civilian airplanes, but for Uncle Sam's jet fighters and bombers."

Those terse, urgent instructions were given to Tandy & Allen Construction Co., Inc., Hackensack, N. J. prime contractors for the new Burlington Vermont Municipal Airport.

Tandy & Allen went right to work. First item needed to "make it quick, but good" was a portable truck mixer plant that could be put up in a hurry —and which would provide efficient production of specification concrete.

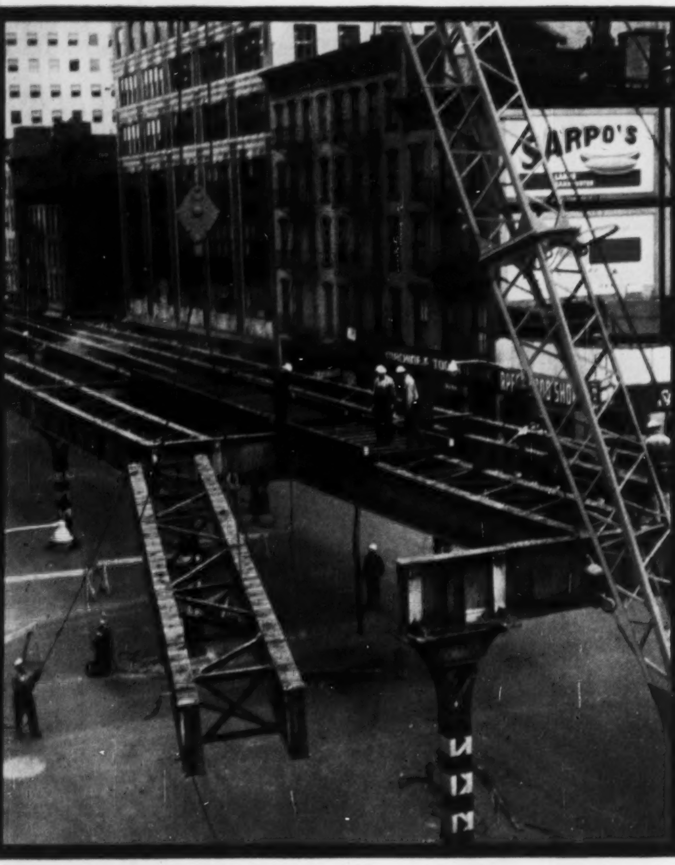
Like hundreds of other contractors, Tandy & Allen found an ERIE Portable Truck Mixer Plant was their best buy. Here's what President Allen D. Allen says about the ERIE plant his firm purchased from Hodge & Hammond, Inc., New York, N. Y.:

"We had the ERIE up and ready to go in just three days. It really kept our trucks on the go with the 15,000 cubic yards of quality concrete needed for runways, ready aprons and hangers. We averaged 200 cu. yds. daily on the project. We're glad to recommend the ERIE to any contractor who needs an efficient, highly portable quick erecting truck mixer plant for fast production of specification concrete."

For literature, write Dept. ______

ERIE STRAYER COMPANY

GEIST RD. ERIE, PENNSYLVANIA



Extra Value makes the difference in Contract Bonds

DEMOLITION of the 3rd Avenue El adds to New York's beauty and municipal pride. Indemnity's individualized bonding service covered this job. The same type of service is available for your surety needs, large or small.

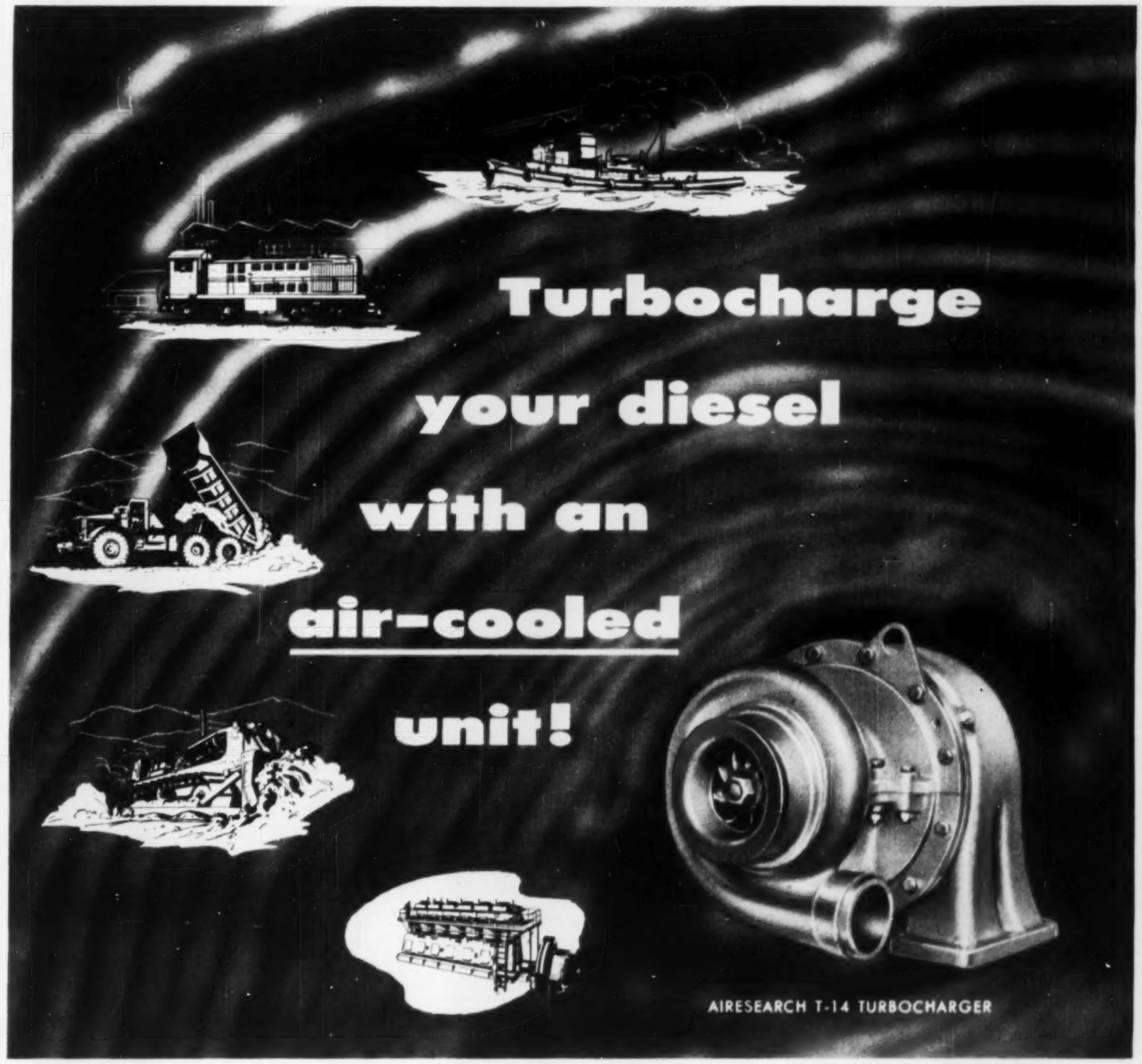
Indemnity of North America has the financial capacity and the experience to furnish bonds covering projects of practically any size or description. A good example is its part in the demolition of New York's 3rd Avenue El, a long-awaited modernization project on the East Side. Indemnity's Bond guaranteed the contractor's performance as per contract. Indemnity's size and the extent and diversity of its activity in the surety field enable the company to maintain a high standard of service that is dependable and efficient. All this means 'Extra Value' in bonding facilities and, for contractors who qualify, preferred rates* and prompt attention to their requirements.

*Not available in Louisiana and Texas

One of the North America Companies which are headed by Insurance Company of North America, founded 1792

INDEMNITY INSURANCE COMPANY OF
NORTH AMERICA
Philadelphia

Protect what you have©


Turbocharge your diesel with an air-cooled unit!
AIRESEARCH T-14 TURBOCHARGER

AIRESEARCH turbochargers increase power to the full capacity of the engine, yet require no extra plumbing and put no added burden on the cooling system.

The diesel industry generally has recognized the fuel-saving, noise and smoke reducing and power-adding advantages of turbocharging. But there are important differences between turbochargers. Some are difficult to service and add complicated plumbing because of the necessity for water-cooling.

All AiResearch turbochargers, from the smallest units for mobile equipment to the large, stationary power plant models, are air-cooled. Each contains a removable rotating assembly which simplifies maintenance, especially in the field. Their modern design resulted from the most extensive experience in the field of small turbomachinery in America.

We invite your inquiry on their application to your diesel equipment.

BASIC SPECIFICATIONS FOR AIRESEARCH TURBOCHARGERS

MODEL	T-10	T-14	T-15	T-30-2	T-30-6
Diameter — in. nom.	9	11.5	15.25	15.25	16
Length — in.	9	14.12	16.75	17.25	21.75
Weight — lb.	40	95	125	135	195
Output — lb/min. (Standard Conditions)	25-40	35-65	35-65	70-95	115-175

THE GARRETT CORPORATION

AiResearch Industrial Division

9225 South Aviation Blvd., Los Angeles 45, California

DESIGNERS AND MANUFACTURERS OF TURBOCHARGERS AND SPECIALIZED INDUSTRIAL PRODUCTS

TRU-LAY PUSH-PULLS

give trouble-free, lifetime service for remote control of construction and quarrying equipment

Operators of Construction or Quarrying Equipment can be certain of maintenance-free service from TRU-LAY PUSH-PULL CONTROLS because of their precision manufacture—rugged construction—lubrication for life of the inner, working member at the factory—complete sealing of the entire unit (a vitally important factor in tough, outdoor operations) against dust, dirt or moisture.

We have never heard of a TRU-LAY FLEXIBLE PUSH-PULL CONTROL *wearing out in normal service.* Examples of heavy-duty applications are shown below. Users of such equipment benefit from simplified equipment design and improved operation.

- Shown here is a tandem roller where two different PUSH-PULL cables are used to facilitate operation. One cable, 156" long, is capable of a 2" stroke to operate the hydraulic steering valve at the front of roller. The second, shorter cable operates tail shaft governor which keeps roller speed constant, upgrade or down.

- More room in the cab of this snow plow was one of the advantages of installing PUSH-PULL cables. This permitted the hydraulic valve to be located at a more convenient point in the chassis. "There are so many things you can do with these flexible cables compared to the old fixed installations," the manufacturer told us.

- Raising and lowering of the dump body on a famous line of hydraulic dump trucks is via TRU-LAY PUSH-PULL cables. With PUSH-PULLS this merely entails the pulling of a button on the dash. The installation did away with cut-up floor boards and levers in the truck cab. TRU-LAY PUSH-PULLS brought easier installation, more convenience and less maintenance.

***Look for PUSH-PULLS** on the heavy equipment you buy. It will be easier to operate and less costly to maintain. For complete information we'll be glad to send you this DATA FILE . . .*

Push-Pull DATA FILE

ACCO

AUTOMOTIVE and AIRCRAFT DIVISION
AMERICAN CHAIN & CABLE

601-F Stephenson Bldg., Detroit 2
2216-F South Garfield Ave., Los Angeles 22 • 929-D Connecticut Ave., Bridgeport 2, Conn.

ing to disagree with, but nevertheless this will be distinctly valuable because the treatment is so very straightforward and, of course, the subject as timely as a subject could be.

MASON G. LOCKWOOD
President
American Society of Civil Engineers
New York, N. Y.

•

SIR—Congratulations on the feature story, "The Engineer Shortage". It contains valuable information which is vital to every civil engineer who has a proper regard for his profession.

A. J. ACKERMAN
Chairman
ASCE Task Committee on Education

•

SIR—My hearty congratulations to you and your staff for the "Special Report—Engineering Manpower" in your Nov. 8 issue. This realistic and constructive appraisal of the civil engineering manpower problem will afford valuable guidance where it is sorely needed.

Especially significant is the observation in your editorial summarizing the report that most of the necessary corrective actions are "management functions." I should like to add the thought that engineers in management should be particularly sensitive and sympathetic to your recommendations. It seems to me that it is a professional responsibility for an engineer in management to do everything in his power to remedy unsatisfactory conditions of employment for engineering personnel under his area of influence or authority.

WILLIAM H. WISELY
Executive Secretary
American Society of Civil Engineers
New York, N. Y.

•

SIR—I would like to take issue (at least at a local level) with your article entitled "Engineer Shortage." I know of two individuals, of which I am one, whose job hunting experience within the last two months indicates strongly that, at least in the New York City building industry, construction engineers are not only not needed, but actually can't get a job.

Both have been to no less than thirty builders offices within the past two months and for the most part there was no indication that a job could be had. (Interviews never even progressed to the point where salary was

(*Continued on page 54*)

Why nothing but Asphaltic construction would do for this new approach to the Golden Gate Bridge...

The difficult job of repaving and widening the Waldo Grade on U. S. 101 is completed. And traffic is now rolling on wide ribbons of velvet smoothness.

Asphalt construction was picked for many reasons. The traditional ones, of course. First low cost. Fast working characteristics. Durability. Smooth riding. Skid-resistance. Economical maintenance.

But there was another important consideration, too. The added width of this project had to be constructed in steep, hilly terrain. Nearly all fills were the side fill variety. Thus, it was *anticipated* that some settlement would occur at the junction of the new fill and the original ground.

Cracking *did* occur in the dense graded mix. Cracking that would have proved costly, time-consuming . . . if not an insurmountable handicap . . . for any other paving material but Asphalt.

With Asphalt construction, however, the cracking was filled . . . the wearing course laid . . . and smooth riding assured for generations.

According to the State of California's own averages . . . the savings effected by using Asphaltic Concrete on the new Waldo Grade Project were $78,564 per mile. Or . . . $290,115 for the 3.68-mile job. A whopping big 43.8% saving!

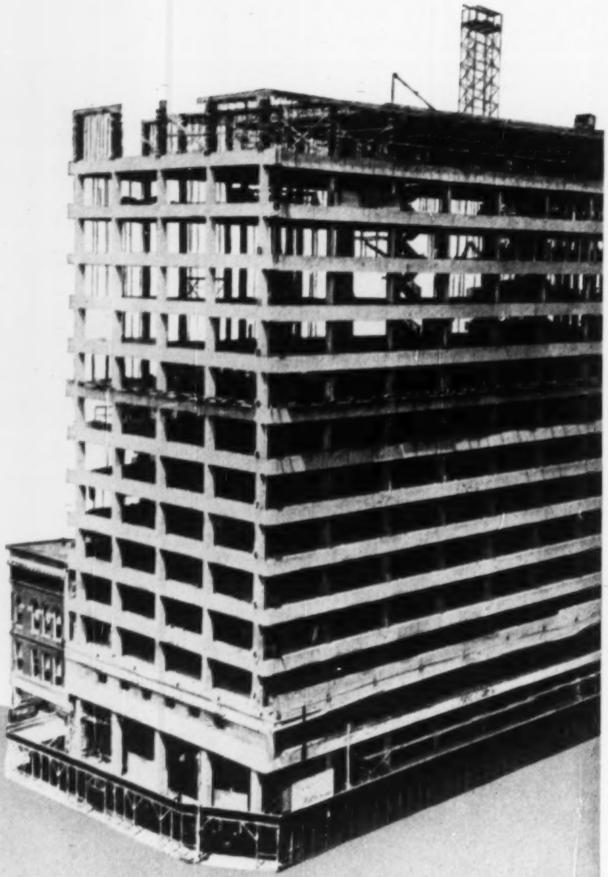
WILLIAM A. RUSSELL

The paving of this outstanding Waldo Grade job was done by the A. G. Raisch Company . . . under the supervision of "Bill" Russell. Mr. Russell writes: *"I have used Asphalt construction for 25 years. I firmly believe that Asphalt can provide the finest surface anywhere it is placed."*

Ribbons of velvet smoothness . . .
MODERN **ASPHALT** HIGHWAYS

THE ASPHALT INSTITUTE, Asphalt Institute Building, College Park, Maryland

how long can you afford to wait for your next building?



buildings start quicker...
are completed sooner with

REINFORCED CONCRETE

Reinforced concrete structures start quicker because all the necessary materials are readily available from local stocks. These faster starts, made possible with reinforced concrete, save months of delay . . . months which will mean reduced interest charges . . . earlier occupancy and extra rental income which could amount to many thousands of dollars.

Whatever your next building may be—hotel, hospital, apartment, or office—reinforced concrete can provide a better structure for less money. It assures rugged strength that is highly resistant to wind, shock, and quake, and is firesafe without extra treatment. No other method of construction provides so great a flexibility of design. On your next job . . . avoid costly delays—design for reinforced concrete!

First National Bank Building*
Jackson, Mississippi

Associated Architects:
N. W. Overstreet and
James T. Canizaro
Jackson, Mississippi

Structural Engineers:
Post & Witty
Jackson, Mississippi

Contractor:
Southeastern Construction Co.
Charlotte, N. C.

* Reinforced Concrete Frame with R/C Duct Floors

Compare . . . YOU'LL SAVE WITH REINFORCED CONCRETE

CONCRETE REINFORCING STEEL INSTITUTE

38 South Dearborn Street • Chicago 3, Illinois

DELIVERING WATER CHEAPER

Engineered and built by the city of Syracuse, N. Y., this 38.7″ Dresser-Coupled steel water supply line was backfilled immediately after each 30′ length was joined, getting streets back to work fast, practically eliminating the problem of trench cave-ins.

Too Quick for Cave-ins!

Dresser - Coupled steel line permits backfilling without delay

Whenever conditions demand immediate backfill, steel pipe and Dresser Couplings make it surer, safer to comply.

On this Syracuse water supply job, for example, the cave-in hazard of unstable sandy loam was heightened by heavy traffic nearby. The problem was solved by immediate backfilling, a standard Syracuse practice on all Dresser-Coupled water lines, where leaving trenches open for line test during construction is considered unnecessary.

Proved in thousands of installations, these factory-tested couplings give 100% bottle-tight joints every time. Their resilient rubber gaskets absorb vibration and pipe-transmitted stresses . . . assure no-leak safety for the life of the line.

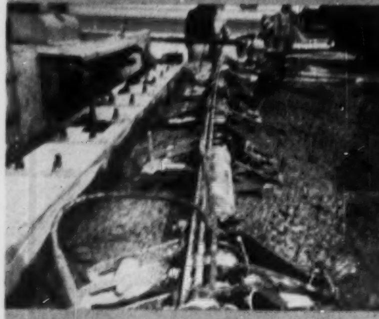
Joining is fast and foolproof. Each coupling part is accurately formed and fitted to go into place simply and easily. No special experience or equipment is required. Using only a wrench, joints can be made up at an average of only two man-minutes per bolt . . . with work proceeding in any weather. Estimated costs and completion dates can be met.

Carrying capacity stays high for good. Gloss-smooth inner surfaces and rugged outer coatings defy incrustation and corrosion. The unequaled combination of Dresser Couplings and long lengths of strong steel pipe provides trouble-free lines that always deliver water cheaper.

Wherever water flows, steel pipes it best. Always put steel pipe and Dresser Couplings in your specifications.

Dresser Manufacturing
Division, Bradford, Pa.
Sales offices in: New
York, Philadelphia,
Chicago, S. San Francisco, Houston, Denver,
Toronto, Calgary.

Everything FOR MORE PROFITABLE PAVING

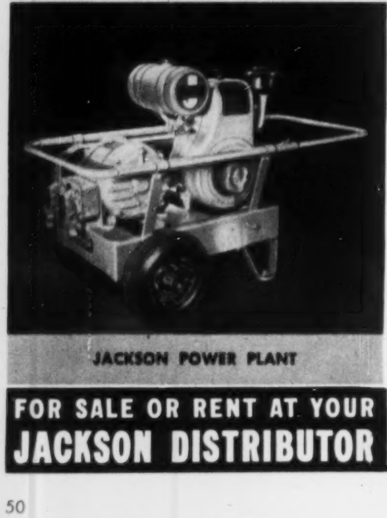


JACKSON PAVING TUBE (INTERNAL TYPE)

JACKSON MULTIPLE VIBRATORY COMPACTOR

JACKSON SIDE FORM VIBRATOR

JACKSON VIBRATORY SCREED



JACKSON POWER PLANT

MACADAM BASE COURSES, SUB-BASES, SOIL-CEMENT PAVING, FILLS

The JACKSON MULTIPLE COMPACTOR has now thoroughly demonstrated that it is by far the most advantageous equipment for achieving or exceeding specified densities in rock, slag, sand, gravel . . . all granular soils used in waterbound and penetration macadam construction, and in filling the voids in rock and slag courses with fines. The Jackson does it in about half the time required with other types of equipment. It is equally efficient for consolidating large granular soil fills such as bridge approaches and kindred projects.

JACKSON INTERNAL TYPE PAVING TUBE

Supplied with extraordinarily powerful motors, no concrete highway or airport paving job is too tough for this improved machine. Tubes vibrate deep in concrete, quickly plasticizing harsh dry mixes in slabs to 24" thick and as wide as 25'. It saves time, saves cement; provides greater density and compressive strength. Cuts spreading costs where no spreader is used. The tube is made up of one unit as shown for each 5'-0" (maximum) of slab width. Usually attached to front of finisher and controlled by finisher operator. Power is supplied by a Jackson Power Plant mounted on the parent equipment.

Use of a JACKSON Side Form Vibrator on standard finisher assures thorough consolidation and plasticity of concrete at side and center forms—with no "missed" spots. Labor savings effected quickly repay cost of equipment.

MUNICIPAL PAVING—BRIDGE DECKS, ETC.

For jobs of this type a JACKSON Vibratory Screed and Portable Power Plant is the most convenient, productive and inexpensive outfit you'll find anywhere. Strikes off to any crown, undercuts at curb and sideform, works right up to and around all obstructions. Two men easily handle it on all slabs up to 30 feet wide, and it may be rolled back for second passes on 4 rollers.

PORTABLE POWER:

Thoroughly reliable, time-proved plants in capacities of 1.5 to 7.5 KVA . . . equipped with permanent magnet generators requiring no maintenance or adjustment. They provide both single and 3-phase 120 V., 60 Cy. AC and may be used for lights as well as operating all JACKSON equipment.

FOR SALE OR RENT AT YOUR JACKSON DISTRIBUTOR

JACKSON VIBRATORS, INC. LUDINGTON MICHIGAN

DART'S "Jr. Work Horse"

is BUILT TO CUT YOUR HAULAGE COSTS

A *REAL* OFF-HIGHWAY UNIT . . . 10 TON CAPACITY . . . 165 H. P. Turbo-Diesel

Here is a truck which will give you profitable service for many years. It is built with the rugged, inherent qualities found only in other larger trucks carrying the DART nameplate. It is the Model 10SL with submerged arc-welded box grinder frame. The 165 H.P. Turbo-Diesel driving through a double reduction rear axle delivers a maximum of power and speed to meet the most rugged road conditions. Tires are 12:00 x 24 all around and steering is hydraulic.

There is a DART man near who can meet with you and survey your haulage requirements at your convenience.

Need More Tonnage?

DART 25 SL

This standard model DART is known the world over for its availability and low maintenance requirements. 25-ton capacity, powered by 300-335 Diesels. Hydraulic torque converter and steering, of course. 69 of these trucks were recently specified in what is one of the largest orders ever placed for off-highway trucks.

DEPENDABLE TRUCKS SINCE 1903

Do you have an unusual haulage problem? Perhaps DART engineers can offer a practical solution. We welcome your inquiries.

D-122

DART TONNAGE ENGINEERED TRUCKS

Kansas City 8, Missouri

SUBSIDIARY OF THE CARLISLE CORPORATION

On the road - off the road...

THE IMPROVED TDA®

"3 FOR 1" LETTER SERIES

DRIVING AXLES

will do the job better than ever before!

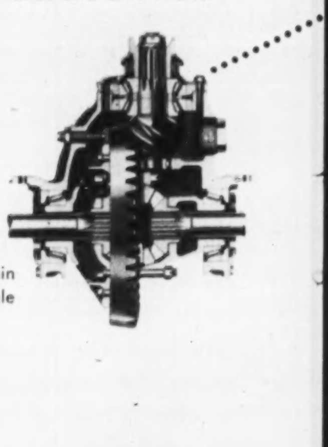
Years of manufacturing experience—plus continuing field and laboratory research—have resulted in many engineering refinements and advanced features on the improved Timken® "3-FOR-1" Letter Series Driving Axles.

With Timken "3-FOR-1" driving axles, housings, axle shafts, differentials, bearings, brakes, hubs and drums—are completely interchangeable within each capacity range, and are standard production items, readily available. This means smaller replacement parts inventory—lower maintenance costs—and more time on the road.

Whether your trucks are engaged in on-the-road or off-the-road delivery and hauling, specify the improved TDA "3-FOR-1" Letter Series Driving Axles for longer operating life—greater flexibility—lower-cost maintenance.

MAXIMUM INTERCHANGEABILITY!

You have your choice of 3 final drives, with each one interchangeable within its Letter Series—using the same housing, hubs, drums, brakes and axle shafts.



HYPOID SINGLE-REDUCTION!

A rugged single-speed power train that gives the maximum in single reduction performance.

Only on the improved Timken "3-for-1" Letter Series Driving Axles will you find these "YEARS AHEAD" features

Improved Hypoid Gears! Redesigned offset and increased Hypoid gear diameter provide longer gear life, smoother performance, and quieter operation—without sacrificing strength or ratio advantages.

Refined two-speed shift collar and cross shaft! Improved design gives positive locking action, virtually eliminates axle slipping out of gear—reduces gear wear and maintenance. Each set of teeth performs but one function—driving or locking.

Improved torsion-flow axle shafts—plus new differential gears! More splines per shaft and increased root diameter give greater torsional strength, longer life.

Famous time-proved differential—rugged, reliable and smooth! Extra strong gear body and teeth, plus hot-forged trunnion, give long trouble-free operation even under roughest treatment.

Hot forged steel axle housing! The rectangular form of these high-carbon steel housings is the lightest, strongest shape of housing available today.

Improved "P" Series Power Brakes and "DH" Series Hydraulic Brakes! Available in a complete range of sizes, these advanced brakes offer the most dependable stopping power—lower maintenance cost—easy adjustment and longer service life.

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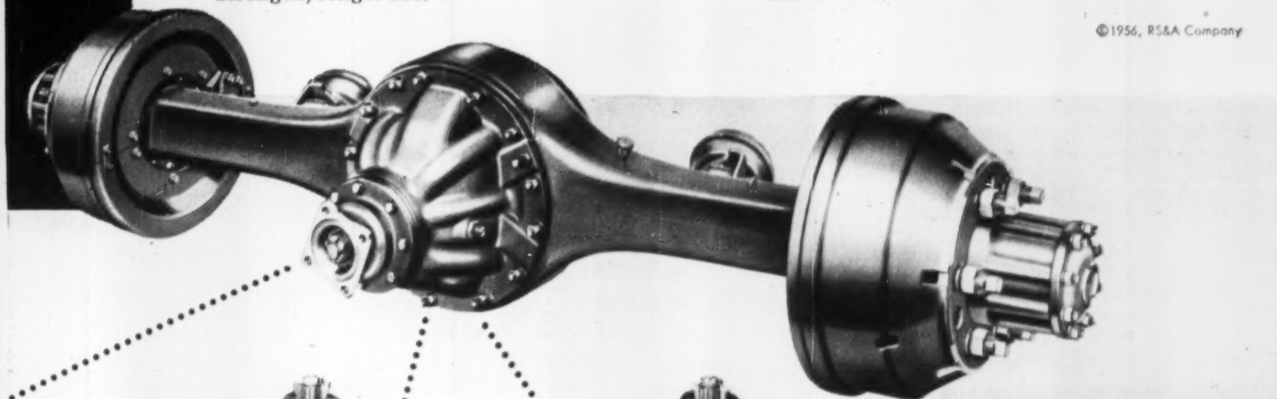
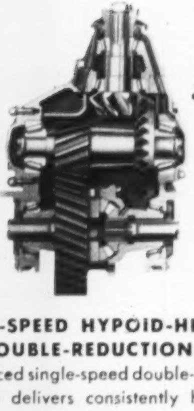
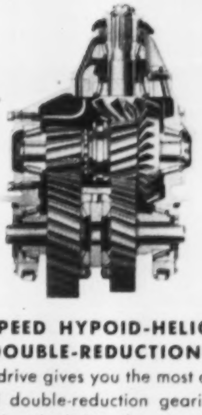




SINGLE-SPEED HYPOID-HELICAL DOUBLE-REDUCTION!

This advanced single-speed double-reduction final drive delivers consistently high performance either on or off the road.



2-SPEED HYPOID-HELICAL DOUBLE-REDUCTION!

This final drive gives you the most advanced two-speed double-reduction gearing available. It's the ideal drive for all-around performance either on or off the road.

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ROCKWELL SPRING AND AXLE COMPANY
DETROIT 32, MICHIGAN

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..."one coat" protection for all around the plant

Don't let moisture, fumes, smoke and weather attack your property and equipment. Protect your metal and masonry . . . your insulating materials . . . with *one* coat of Flintkote Hydralt.

Yes, even one coat of Hydralt gives thick film, more economical protection against corrosion, rust and the effects of moisture infiltration than 8 or 10 coats of paint. And think of the time savings, too.

Hydralt Protective Coatings are unique (clay-type) asphalt emulsions. Films about 3/64" thickness have provided completely satisfactory resistance to weather in industrial atmosphere for over 24 years.

These Hydralt coatings are reinforced within themselves . . . will not crack, craze, or alligator under exposure. Will not soften or flow under heat. Won't sag or peel off.

They are odorless. Non-flammable to apply by brush, spray or trowel.

Flintkote's line includes the right products for your protective coating needs. For light reflective surfaces . . . Asphalt base Aluminum Paint. For oil or grease resistance...ORTAR† Emulsion Coating.

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†Trademark of The Flintkote Company

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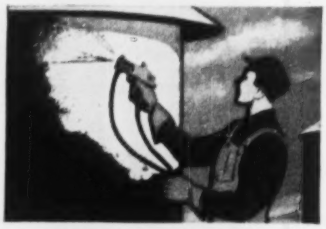
Masonry structures resist weather better with Hydralt.



Apply Flintkote Aluminum Paint over Hydralt, for light color.

Protect insulating materials from weather with Hydralt.

Keep moisture out of foundation walls with Hydralt.

Keep dampness out of interiors with Hydralt.

. . . Reader Comment

even mentioned.) Both have advertised in technical literature with little or no response.

What's wrong? You tell us. We've looked independently to no avail. We think that there's no shortage of construction superintendents in this town, nor has there been for quite some time.

R. F. LEVIN
New York, N. Y.

[EDITOR'S NOTE: Reader Levin confirms our finding that the shortage in general is not critical. Certain jobs are hard to fill in certain areas. Apparently construction supers in New York City are not among these.]

•

SIR—Your report on engineer manpower states, "some progressive public agencies have instituted competitive pay scales and are attracting a share of the graduates."

I would certainly appreciate knowing the names of these agencies in order that I can discuss this problem with their personnel. Although public agencies generally operate under the same broad rules, there are several different ways of playing this game that can be turned to the advantage of the organization. Hence, a discussion with them may be of real value to us here.

GEORGE W. OWARD
Technical Director
Engineer Research and Development Laboratories
Fort Belvoir, Va.

•

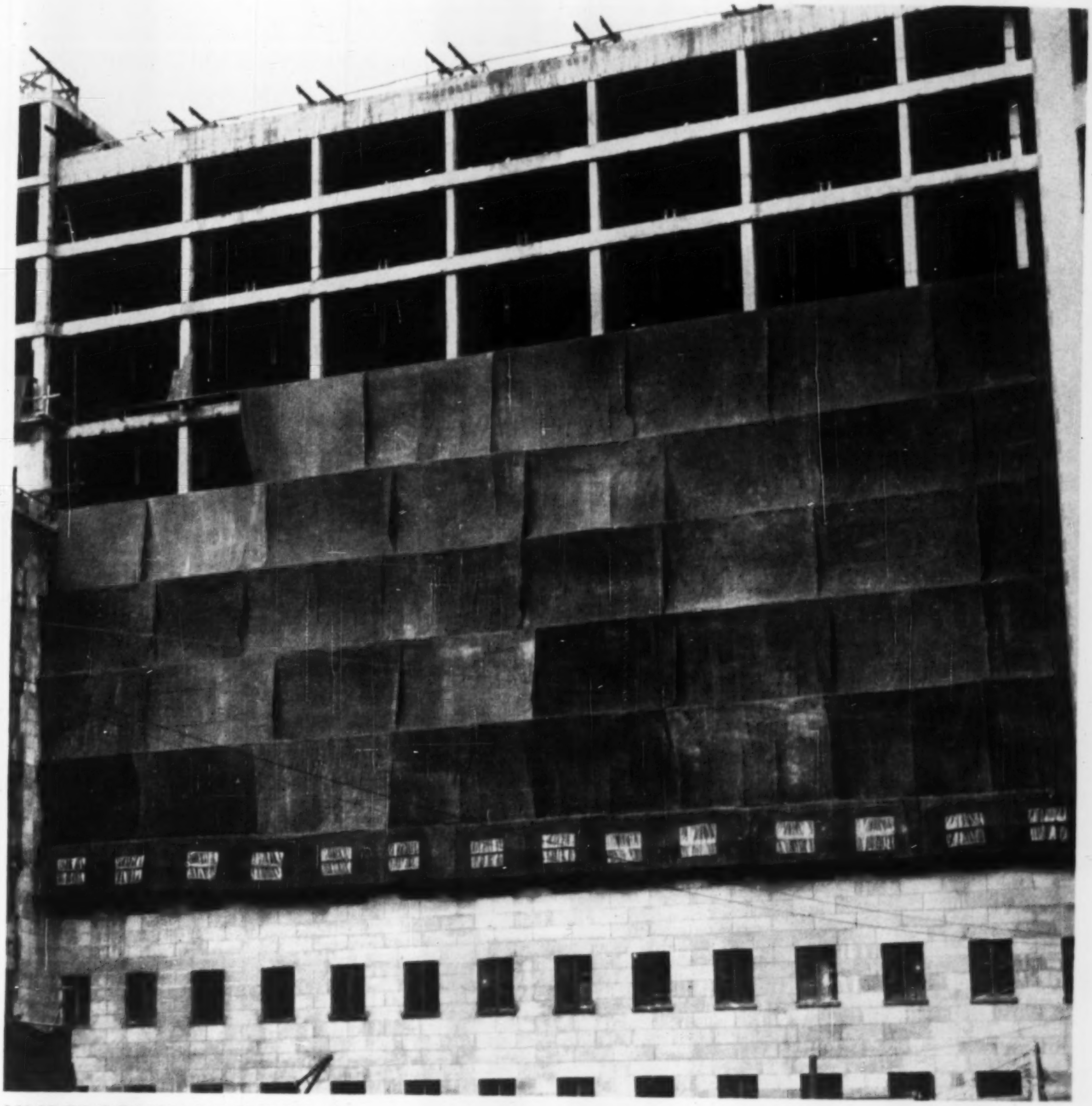
SIR—In your very fine, informative report on "Engineering Manpower," you refer to a "2 year community college," and also, a reference is made to the "technical institute." Are there any near the source of this letter?

RICHARD F. WILLIAMS
Syracuse, N. Y.

[EDITOR'S NOTE: New York State operates 17 such schools.]

Reprints Available

Single copies of ENR's special report, "The Engineering Manpower Problem in Construction," may be had at 10 cents each. In quantity, these reprints are available at $7.50 per hundred. Send orders to T. F. Contrada, Rm. 1500, 330 W. 42 Street, New York 36, N. Y.



UNDERCOVER PROJECT – During the construction of this mammoth-$14,000,000 building – soon to be occupied by the University of Pittsburgh Schools of the Health Professions – a great deal of work was carried on in severe winter weather and over several sections of the building at one time. In order to maintain uninterrupted construction schedules, Ragnar Benson, Inc., General Contractors, utilized a considerable number of these large protective tarps made of Mount Vernon canvas. At one time, nearly 500 giant tarps were simultaneously in use to protect workmen, masonry and freshly set limestone facing from the ravages of the weather. Tarps manufactured by Pittsburgh Waterproof Company.

This is another example of how fabrics made by Mount Vernon Mills, Inc. and the industries they serve, are serving America. Mount Vernon engineers and its laboratory facilities are available to help you in the development of any new fabric or in the application of those already available.

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Want performance in a shovel? Then get a BAY CITY ¾ YARD. Its snappy swing, quick, responsive controls, fine balance and powerful engine provide a fast digging cycle. That means dollars to you in the field.

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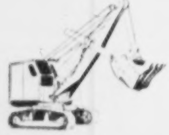

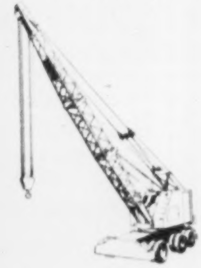

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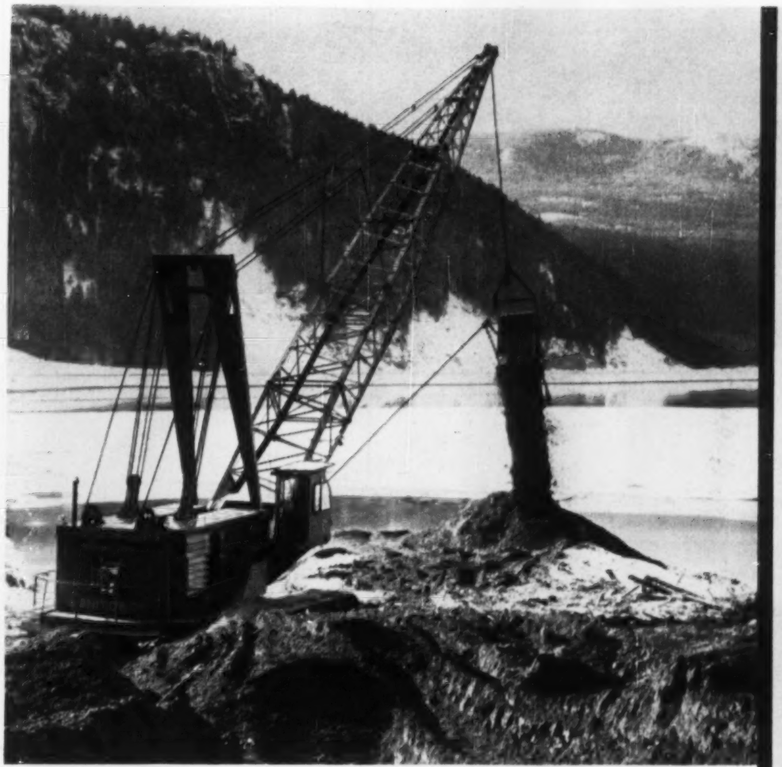

Leading Fleet Owners Depend . . . on Manitowoc

All over the country leading contractors have come to depend on Manitowoc for big, steady production, rugged service and long-life. Dozens of repeat sales to fleet owners prove that superior Manitowoc performance leads to additional orders when the purchase of new machines is considered.

Manitowocs are the choice of successful contractors because there's greater utilization of engine power through direct power flow to the dipper. As a result, operating cycles are faster . . . help to finish jobs ahead of schedule. This simplicity of design cuts down on the number of moving parts, keeps downtime negligible. Smaller rigs in the line offer greater weight with the lowest cost per pound of machine in the industry. Larger units like the 5½-yd. Model 4500 shown above have the beef and brawn needed for the big, tough jobs, yet are as mobile as a small excavator. Best of all, quality of Manitowoc construction matches quality of performance.

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SHOVELS 1-5½ YD. Speedcrane **CRANES 20-100 TON**

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Permalite plaster*, used to fireproof structural steel members, gains 4-hour fire-ratings in

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(and many other noted buildings)

Nationwide–noted buildings gain many advantages with

Permalite®

the world's largest selling Perlite aggregate

for **BETTER PLASTER**
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LIGHT WEIGHT

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PERSONAL RESIDENCE OF DESIGNER CLIFF MAY
(Permalite insulating concrete* Sub slab in 7,000 ft.² floor slab)
Los Angeles, Calif.

* *the terms*

*"Permalite plaster" or "Permalite concrete" mean plaster or concrete in which Permalite expanded perlite is used as the aggregate.

Write for information on the many advantages of Permalite in modern construction

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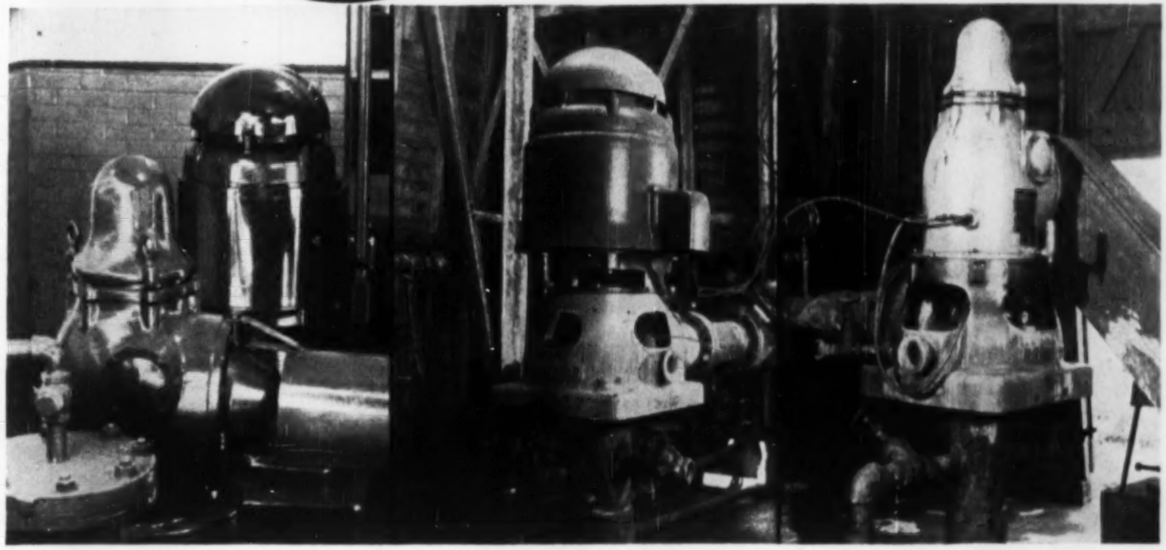
PEERLESS PUMPS ON THE LINE



FOR *Fire*... FOR *Water*... FOR *Brine*...

MORTON SALT "WHEN IT RAINS—IT POURS"

HERE IS INSTALLATION VERSATILITY AVAILABLE ONLY WITH VERTICAL PUMPS

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They provide approved fire protection—

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FOOD MACHINERY AND CHEMICAL CORPORATION
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Distributors in Principal Cities.
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Please send vertical Pump Bulletins describing ☐ *FIRE PROTECTION* (B-1500) ☐ *INDUSTRIAL SERVICE* (B-505) ☐ *WATER SUPPLY* (B-141)

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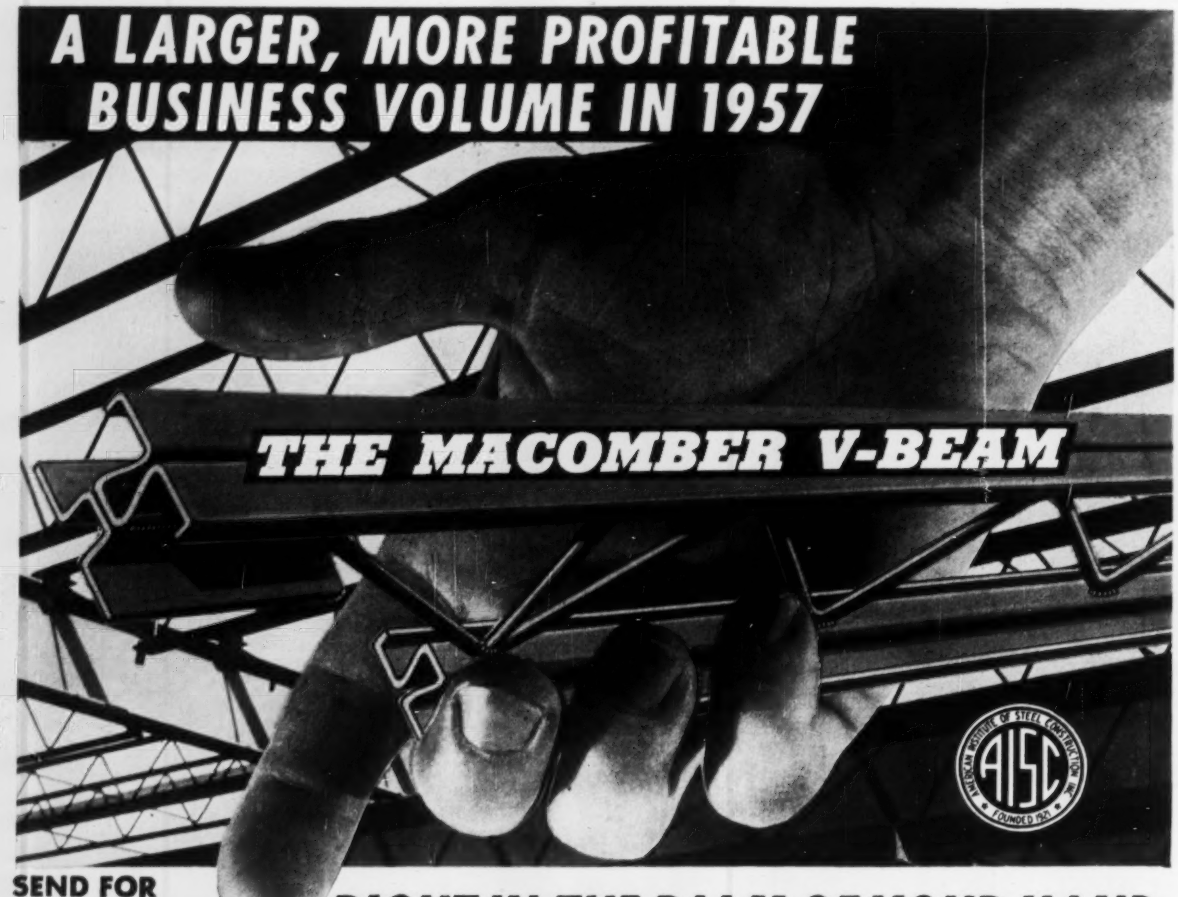
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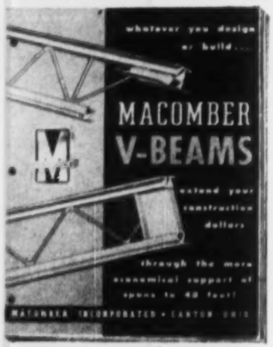

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extend your construction dollars
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Not in our 35 years of fabricating experience has a framing product equaled the immediate acceptance of Macomber V-BEAMS.

TO YOU, THIS MEANS that engineers who design steel buildings and contractors who buy steel have discovered that Macomber V-BEAMS build a stronger building for less.

That catalog will enable you to check your loads and spans for a V-BEAM quotation on your next project with the Macomber Representative near you.

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NAILABLE STEEL JOISTS
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LONGSPANS
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BOWSTRING ROOF TRUSSES
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METAL DECK
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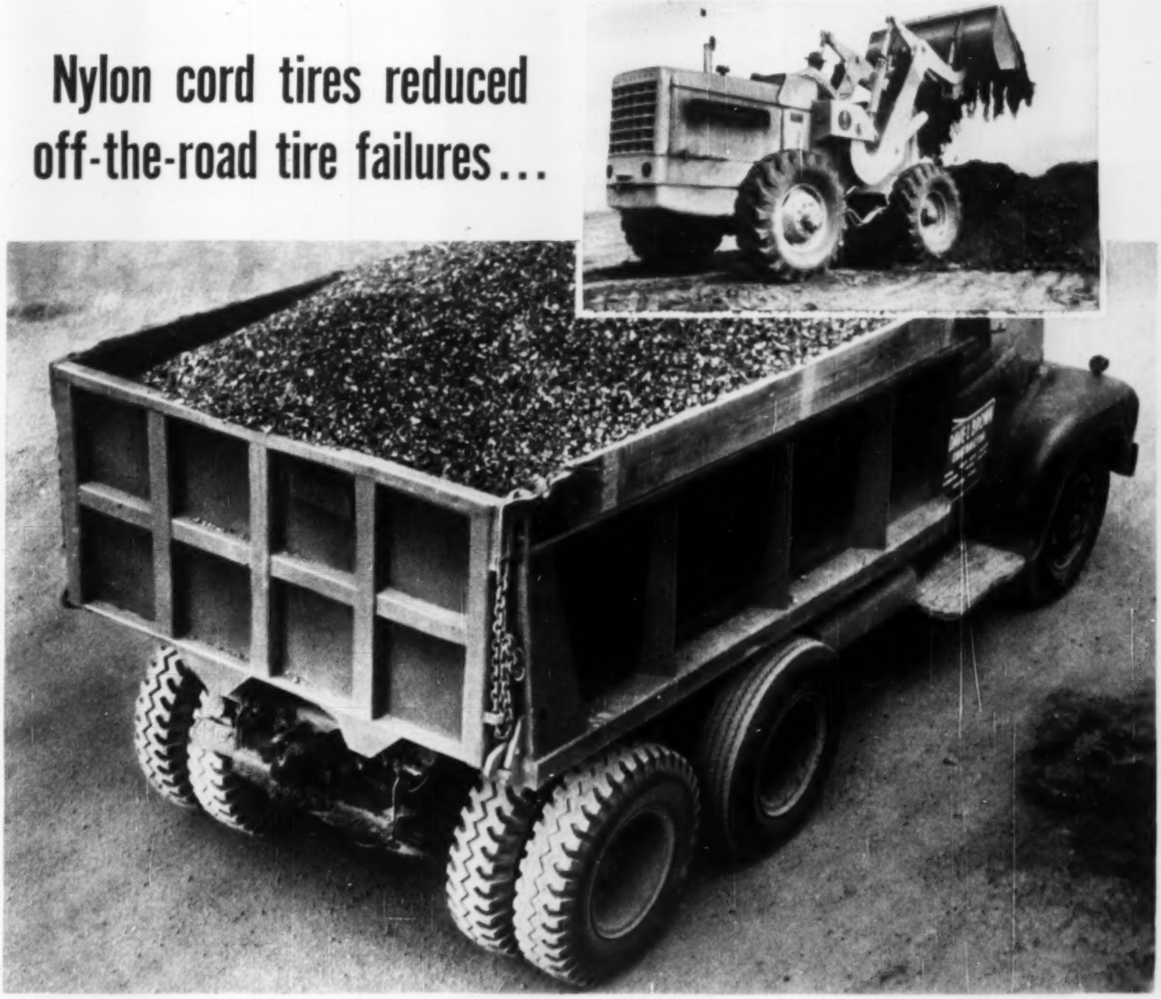
STRUCTURALS

Nylon cord tires reduced off-the-road tire failures...



NOW NYLON CUTS TRUCK TIRE COSTS, TOO

HANS G. BINGHAM, Shop Supt.
Dave L. Brown Company
Chattanooga, Tenn., reports

"We're switching our 147 pieces of rolling construction equipment to nylon cord tires. We've tried nylon cords for just a year, but that's enough to convince us they're big money savers. They last about 50% longer than our best standard tires. Really stand up to those twenty-ton loads . . . even on steep grades and rough terrain.

"In our business, road delays often mean the difference between profit and loss. Nylon cords have reduced costly tire-failure delays approximately 50%."

PROVE TO YOURSELF that nylon cord truck tires give more mileage, more retreads—lowest cost per mile. Ask your dealer about nylon cord truck tires today. (Du Pont makes the tough nylon yarns, does not produce tires.)

DU PONT NYLON for TIRE CORD

DU PONT
REG U S PAT OFF
BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

NOW, IN PASSENGER-CAR TIRES, TOO . . . THE STRENGTH AND TOUGHNESS OF NYLON . . . FOR UTMOST SAFETY, SUREST PROTECTION AGAINST TIRE TROUBLE

Royal Cord Air Hose

WEAKLINGS DON'T LAST HERE...

It takes U. S. Royal Cord (the air hose built like a tire) to handle jobs like this—to take the worst kind of punishment *wherever* air lines are used. The cord construction increases resistance to internal pressure, yet produces a hose of extreme flexibility. U. S. Royal Cord has remarkable resistance to blows or bruises caused by blasting, or by heavy tools falling on the hose or by trucks and other vehicles running over it. *Never needs cribbing.* Its smooth, brown cover is the *toughest* ever put on a molded hose. No matter how great the shock, no matter how excessive the pressures on any job, U. S. Royal Cord is the *quality* air hose that pays off—in jobs performed and in long life. It proves that it never pays to buy cheaply-constructed hose.

U. S. Royal Cord Air Hose is obtainable at any of the 28 "U. S." District Sales Offices, at selected "U. S." distributors, or by writing U. S. Rubber, Mechanical Goods Division, Rockefeller Center, New York 20, N. Y.

Watch NCAA football, Saturday afternoons, NBC-TV

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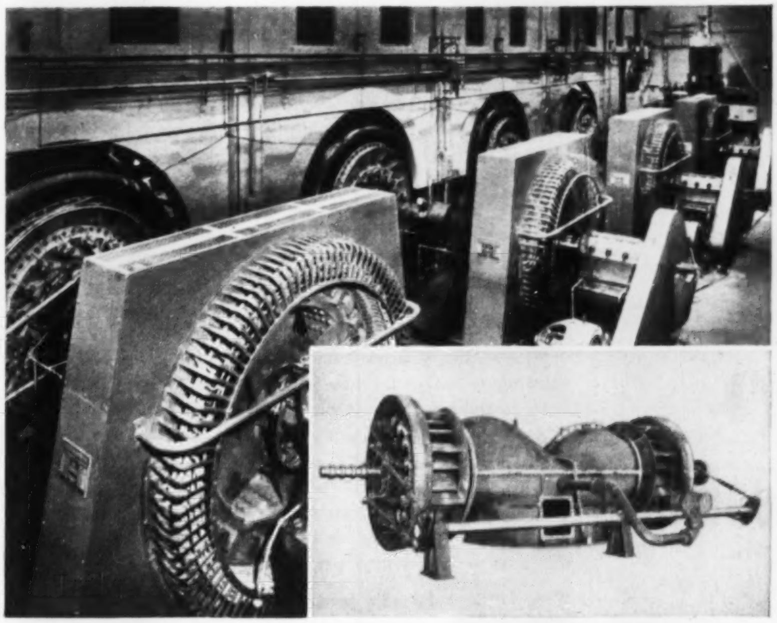
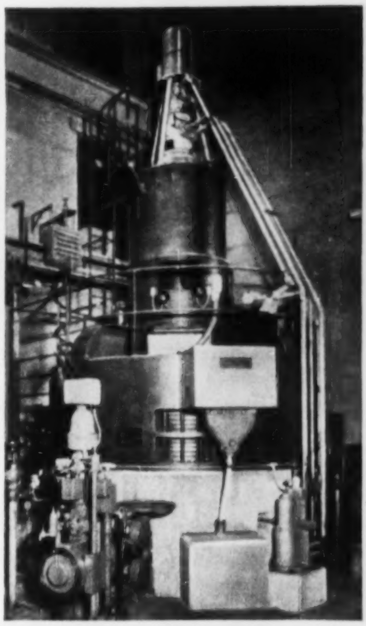


Horizontal generating units are each driven by a pair of modernized SMS-Francis turbines shown (inset) during shop assembly.



At remote end of the power house, a vertical SMS-Kaplan unit, mounted in a concrete pressure flume provides flexibility of operation.

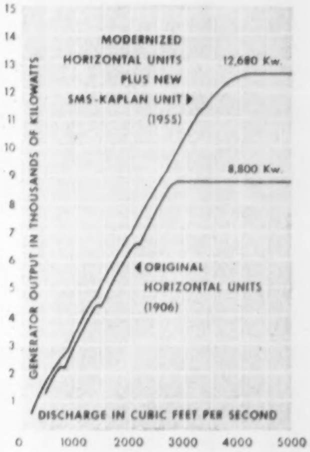
Consulting Engineers: Pioneer Service and Engineering Co., Chicago, Ill.

MINNESOTA HYDRO-PLANT WITH SMS TURBINE MODERNIZATION BOOSTS OUTPUT 35%

By completely modernizing a half-century-old horizontal turbine installation having the inside type of gate mechanism, the Upper Midwest's largest utility has raised the potential KWH output over 35%. This resulted from increased plant efficiency and greater installed capacity. The rebuilding program was a result of careful engineering studies made over several years by SMS in cooperation with the utility and their consultants with whom the purchase of modernized horizontal turbines was finally negotiated.

Four pair of horizontal SMS-Francis wheels with motor operated outside gate mechanisms were mounted on new 9-foot draft chests in the existing 14-foot diameter top supply pressure cases. An additional SMS-Kaplan turbine, rated at 3,500 HP under the 48-foot head, was added to provide flexibility and take load variations at a high efficiency over a wide operating range.

Whether your interest is modernization or a new station, you can rely on the broad engineering background of 80 years' experience available to you at SMS. For information on hydraulic turbines and accessories, write S. Morgan Smith Co., York, Penna.



Performance of modernized units based on index tests run in January 1956. Performance of original units based on guarantees when new.

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HYDRODYNAMICS

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CONTROLLABLE-PITCH SHIP PROPELLERS

S. MORGAN SMITH

AFFILIATE: S. MORGAN SMITH, CANADA, LIMITED, TORONTO

Emergency pipe order gets quick Action from Armco Salesman

On August 8, a short-section rigid pipe storm drain failed under a street in Kansas City, Missouri. The pavement collapsed and traffic was blocked. At 4:30 Maurice Ellis, a young Armco sales engineer serving this area, received an emergency phone order from the Park Department for 110 feet of 36-inch-diameter Armco Corrugated Metal Pipe. He then called the Armco plant in Topeka, ordering fabrication. At 8:00 A.M. on August 10—exactly 39½ hours later—an Armco truck was at the site with the pipe!

Unusual? Not exactly. This is the type of service you *learn to expect* of Armco salesmen.

Maurice Ellis is a *typical* Armco sales engineer—trained to give all-out service to engineer and contractor customers as part of his job.

At one site you may find him kneeling on the ground, showing a new crew how easily Armco MULTI-PLATE Pipe bolts together. Another place, he may be twisting a soil auger, helping an engineer plan the location for Armco HEL-COR Perforated Pipe. Muddy clothes and a stiff back are his occupational hazards.

Your own Armco salesman may be an ambitious young engineer. Or he may be a 25-year veteran. Both know the answers on Armco products.

Want Efficient, Friendly Service?

You'll find Armco sales engineers can talk about section modulus, H-15 loadings, freight rates, local codes or who's going to win the pennant. Toss him a problem and he won't grab for the order book. He knows it pays to have the customer's best interest at heart, even if no sale is involved.

Next time, give your Armco sales engineer a call. He won't give you the impersonal "mail-order catalog" treatment. His motto is "service" and he can prove it with deeds.

If you don't know him, write us for his name and address.

Armco Drainage & Metal Products, Inc.

5176 Curtis Street, Middletown, Ohio. Subsidiary of Armco Steel Corporation. In Canada: write Guelph, Ontario. Export: The Armco International Corporation.

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ENGINEERING NEWS-RECORD

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THE CONSTRUCTION WEEK

LAWYERS ON THE ROADS—One thing that was clear at last week's AASHO meetings at Atlantic City (see also p. 69) is that the courts and the lawyers will be doing nearly as much work on the highway program as will the engineers, contractors, and administrators. One particularly knotty legal problem is that of frontage roads, to provide service to properties abutting the right of way of the interstate system expressways. How to determine where such roads are necessary, and how to pay for them (90-10, or 50-50, or maybe not at all where other local routes exist) was left to an advisory committee of AASHO, which will work with the Bureau of Public Roads—and the lawyers—to find an answer.

"CHRISTMAS PRESENT"—That's what an official of Consolidated Edison Company of New York called his utility's $55-million nuclear power plant as he announced to a Westchester County civic group last week that they would see the A-plant under construction in December. The 236,000-kw installation is scheduled to be producing electricity in 1960 at Indian Point on the Hudson River.

AS EXPECTED—The Federal Power Commission ruled last week that it is without authority to issue a license to the Power Authority of the State of New York for the proposed hydroelectric project at Niagara Falls. FPC ordered the license application dismissed, arguing that it could not determine the validity of the 1950 Senate treaty reservation giving Congress the right to determine who should develop Niagara's power potential. PASNY will appeal the FPC ruling to the courts—its objective all along. And in the meantime, Congress will surely have new legislative proposals up for consideration—PASNY's real hope for an early, favorable decision.

HOW MUCH PER MILLION?—How much of a given material such as aggregate or steel is required for each $1 million worth of highway? The Bureau of Public Roads knows now or soon will. The study is designed to provide states and materials suppliers with a quick way to estimate the amount of material needed for each highway project.

The first report shows the average amount of aggregate used in each state for each $1 million in road construction. The U.S. average for use of aggregate material or interstate roads is 47,500 tons per $1 million of urban road construction and 103,000 tons for rural mileage.

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WASHINGTON OBSERVER

A new fight over a federal high dam in the West is about ready to pop. It will involve just about all the elements of the Hells Canyon fight, plus some new issues of its own. Background is this:

A group of Northwest power companies is applying for a license from the Federal Power Commission to build dams—Mountain Sheep and Pleasant Valley—on the Snake River in Idaho. They would be downstream from the Hells Canyon area in which the Idaho Power Co. is already working on one of three dams it has been licensed to build by FPC.

But Interior Secretary Seaton may recommend instead a single high dam at Pleasant Valley—a dam which Reclamation Commissioner Dexheimer says is "entirely feasible . . . Regardless of who might build it." But this dam would flood out completely Idaho Power's licensed Hells Canyon Dam. Brownlee, farther upstream, is the one under construction.

This has all the makings of another public vs. private power fight. Seaton may decide that politically the high Pleasant Valley Dam would help blot out the fuss and furor over the Administration's withdrawal of its high dam proposal at Hells Canyon in favor of privately built three low dams. Seaton could ask for an all-federal dam, or propose it as a partnership project with private companies supplying the power plants and selling the power. Public power groups are already steamed up and ready to go.

•

A new push is under way for civil defense shelter construction. But right now it seems unlikely that much—if any—federal money will be earmarked for the program next year.

The White House is being asked to approve some $200-million to be included in the budget request of the Federal Civil Defense Administration—but so far there's no decision whether it will actually be included.

FCDA says the money would go for a pilot program. One big bottleneck to any project at all is that the present law requires the states to match any federal spending dollar for dollar, which the states have shown no interest in doing.

Some months back, a $2-billion a year program was called for by a House subcommittee as protection against radioactive fallout. Rep. Chet Holifield (D., Cal.), who headed the subcommittee is going to introduce a bill to build shelters without requiring states to match.

Congress has turned down three requests for funds in the past, mainly on the basis that there are few specifics as to where and how the shelters would be built. Apparently, FCDA still lacks any detailed plans.

•

A separate labor-management law for the construction industry is being talked at the private conferences being held between construction industry officials and AFL-CIO Building Trades officials. The conferences, set up by Labor Secretary Mitchell, have taken a tack away from amendments to the Taft-Hartley law towards the discussion of a special law that would be tailored to the construction industry's own special problems.

A unanimous recommendation for such a law has only an outside chance. But it's considered as being a better prospect than Taft-Hartley amendments.

•

Construction union man has the inside track for a spot on the National Labor-Relations Board. He is Francis Ward, general counsel of the AFL-CIO carpenter's union. Ward, whose name has been mentioned for NLRB board vacancies before, is reported to be leading the field of White House choices under consideration.

CHECK LIST of how a modern truck-crane speeds schedules

Here's a line of advance-design machines that incorporates so many work-speeding advantages that owners have completely revised their existing production standards. In addition to the list of features below, these truck-cranes offer as standard equipment, true power hydraulic controls—Speed-o-Matic, that make the operator's job easy, safe. He gets fast, positive response . . . perfect "feel" for speed with accuracy. Small wonder there's a big swing to Link-Belt Speeder.

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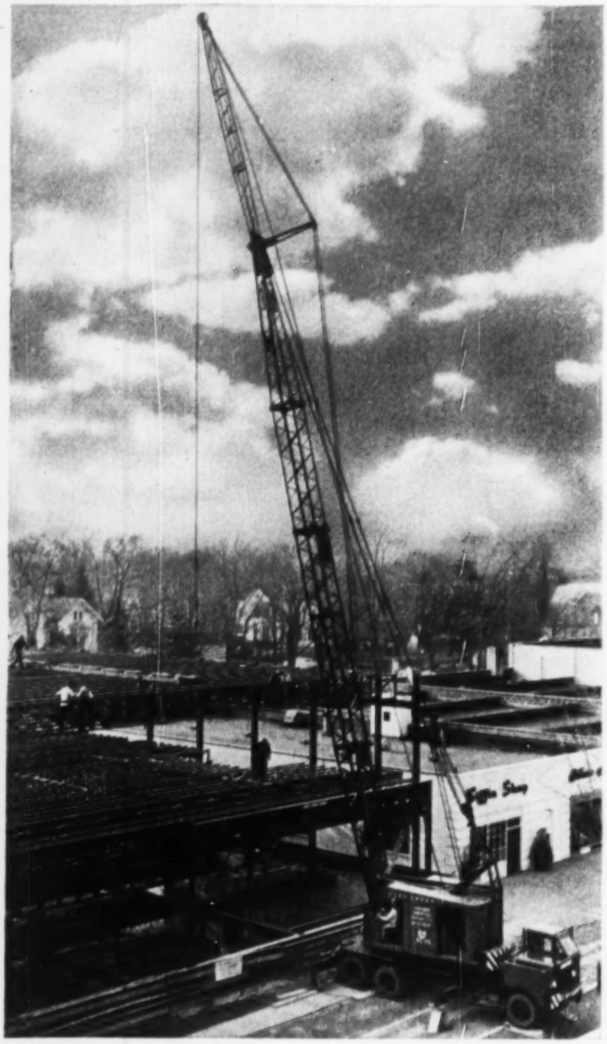

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ENGINEERING
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AASHO AND THE INTERSTATE SYSTEM

Officials meeting at Atlantic City are told . . .

- **The present construction pace must be doubled**
- **Design work is currently far behind schedule**
- **Public relations can ease right-of-way problems**

There Are 41,000 Problem Miles Ahead

The hard outlines of exactly how complex are the problems posed by the multi-billion national highway program began to emerge last week, as members of the American Association of State Highway Officials completed week-long working sessions at Atlantic City, N. J.

It was obvious, too, that the magnitude of the job to be done was a little shocking even to the highway officials themselves—in spite of their intimate knowledge of the highway program in general, and their long fight to obtain the bill that Congress passed in June 1956.

And a sense of urgency pervaded the meeting, because it was very clear that the program is not now on schedule. It is currently running according to Bureau of Public Roads officials, at a rate of somewhat less than $20 million per week in contract lettings. In order to meet the goal set by Congress—roughly $2 billion in the first year—it will have to step up to at least $40 million a week.

Highway officials are well aware of the problem that such a figure imposes—most of the jobs that make up the present $20-million weekly rate are not new jobs at all, but work on which planning was done during the past several years in anticipation of the passage of the bill, or to meet needs that would have had to be satisfied whether or not such a bill was ever passed.

Somewhere, and soon, new work must be flowing from the drawing boards to the contract letting stage. And despite all efforts, it's still a matter of about two years from preliminary plans to contract drawings. Any speedup in that schedule means more personnel, more machines, more money from the states.

As the highway chiefs see it, the key problems before them boil down to four: public relations, personnel; legal troubles; and the whole concept of limited access.

Lesser problems are endless—ranging from driveway control to lighting, from detours to contract letting, from electronics to field party notes. There's an enormous amount of information, vital to the program, that's only now being gathered.

After five days of listening and talking, one official summed it up: "In spite of everything, we've got more to do now than we thought we had. We always said: 'if we only had the money . . .' well, now we have it, and we're just at the beginning of what we have to do."

• Public Relations

Greatest emphasis, in every session and by every speaker, went on the question of public relations—getting public acceptance of the new program. There were plenty of danger signals flying around the meeting rooms to indicate that opposition to some phases of the system has appeared and is hardening.

Specifically, the highway men were talking about making use of every available means to sooth shattered feelings, silence or mute local opposition and hold down land acquisition costs. Speakers told them how to make their dealings with landowners as human as possible, to avoid the appearance of arbitrary action, to make a point of explaining thoroughly the plans they are making, the necessity of the roads they will build and the increased value that will accrue to all properties within several miles of the new highways.

Also, it was made clear, there will be a lot of un-selling to do. During the recent campaign, said one speaker, politicians of both parties made use of the new road program to promise many things that won't be done—everyone won't have a four-lane highway at his door, every country road won't become a boulevard. A lot of people are going to be disappointed if these things fail to come to pass—and they'll also have to be convinced of the soundness of the reasons.

• Limited Access

One big reason behind this demand for best possible public relations is the controversy over the concept of limited access as required under the 1956 act for the 41,000 mile interstate system.

In principle, it was apparent that most highway officials were in favor of this concept. But many local business men, property owners and others representing commercial interest are not, once the real meaning of the phrase gets through to them.

Most Congressmen have swung to acceptance of limited access influenced by the general approval of the public. But New Mexico's Senator Denis Chavez, pinch-hitting on the program for Congressman George Fallon, one of the authors of the 1956 law, caused a considerable stir at the meeting's only general session when he asked the highway men to "consider the possibility" of not bypassing small towns and business places—particularly in his own sparsely settled home state.

On the other hand Senator Edward Martin of Pennsylvania, formerly an energetic critic, swung to support solidly the use of limited access for network highways.

There is no question, engineering-wise, of the advantages of limited access (one speaker suggested using the term "planned access" as a better designation), which would bar direct entry on the expressways for abutting prop-

. . . 41,000 miles of problems ahead

erty owners and businesses. But there is considerable question, it was apparent, of the legalities of the situation. Legal aides to the various state highway groups, addressing various sessions, made it very clear that the state laws differ widely on the rights of property owners—impossibly involved problems of how much of a piece of property should be taken for the right-of-way—particularly if the land actually needed for the roadway would leave only a comparative scrap of land to the property owner; as whether a structure, such as an overpass, is really a damage to the abutting property; of the right of a business man to compel the state to maintain a facility that brings him trade, must be settled.

In addition, numerous hearings, public meetings, and the like, in addition to more normal court actions must be held under provisions of the new law.

Vital to the program also is the legal standing of laws that permit acquisition of right-of-way for future highway use. Discussions again indicated that a whole new body of legal interpretation is coming out of the courts now on the question of whether the states have the right to "freeze" a piece of property, forbidding the landowner from improving it, although the state does not intend to make use of the property for several years.

• No End to Problems

Other discussions during the five-day meeting simply served to point up the complexity of the problem before the highway program.

Maintenance of the new roads—and old ones that will still be in service—occupied a great deal of the time of those attending.

Maintenance problems discussed ranged from control of litter to proper methods of clearing snow and ice, from types of plantings in median strips to width of shoulders; from weed and foliage control to marking of service areas; from maintenance of fences to provisions for passage of wildlife across the highways (Wyoming mentioned that it had had to build underpasses for antelope, lest the road upset the animals' mating and winter forage habits).

Communications on the roads—between headquarters and maintenance and police equipment, and even motorists themselves—occupied a lot of time. One thing that came out of this discussion (see accompanying story) was real "dream stuff"—the idea of tiny, controlled-range radios in every car, that could be used to "talk in" motorists into metropolitan areas, just as airplanes are "talked in" to the traffic pattern of an airport. The little radios could also be used to warn of road dangers such as ice, fog or jams ahead, and would of course have civil defense uses.

• Sign Language

Part of communications also would be signs—and this matter came in for earnest consideration.

On the question of route marking of the new interstate system roads, two basic ideas now are under consideration. One would call for a new series of numbers, distinct from any now in use. The other would use existing numbers, superimposing the letters "I.S." or the word "interstate" rather than the usual "U.S." In both cases the objective would be to designate the new roads specifically, but relate the geographic location to that of existing and familar routes.

The discussion of signs divided itself into two major parts—one concerned with the problem of uniformity of signing from one end of the nation to the other, to insure that motorists cannot mistake warning signals or other advises to them.

An equally serious point was the concept that new kind of signs must be developed. Since, by terms of the highway act, the new interstate system will bypass many towns and cities, and will permit no service areas within its right of way, it will be necessary to advise motorists of the location of service facilities such as automobile repair stations, hotels, restaurants or business districts.

Signs for this purpose will of course have to be easily read and understood by the driver of a fast-moving automobile, and must be so placed as to give him ample warnings, well before he reaches a point where he must leave the interstate road to reach the services he may desire or need.

• Personnel

Running behind all the discussions, of course, was the looming question of adequate personnel to prepare the plans and perform all of the myriad jobs that will be involved in the program.

The problem of finding enough engineers and technicians has been hashed over at great length at nearly every engineering gathering for the past several years—and the highway administrators wasted no further time on discussions of it at Atlantic City.

But their rapt attention to details, explanations of the uses of computers, aerial photography and other mechanical shortcuts; and their heavy attention to discussions of streamlined management practices; were ample evidence of their drive to remedy the situation as best possible.

Most agreed that the obvious solution to the personnel problem: higher pay for engineering employees—was at best a slow and extremely difficult objective. So they concentrated their efforts on other means of supplementing what staff they now have.

• Federal Role

Overshadowing the meeting, of course, was the government of the United States, in the person of the Bureau of Public Roads, which will have a major role in the carrying out of the new highway program.

And the bureau made it very clear that it would help all it could—but that the burden of the job rested squarely on the states.

Bureau speakers—Bertram D. Tallamy, who will become Federal Highway Administrator late in January, John A. Volpe, now Highway Administrator, and C. D. Curtiss, commissioner—commented that BPR is making many moves to streamline its own operations, cut through red tape, and assist the states as best it can. But, said Volpe, although the law says the U.S. will put up 90 percent of the money for the interstate system, it will be only a 50-50 partner in getting the job done. The problem of land acquisition, design, contract letting, and supervision will be entirely in the hands of the states. This is true, also, for the question of aiding the BPR in the numerous studies that it has been ordered to make for Congress.

Some of the things BPR has done, said the speakers, include delegating to BPR division engineers the right to approve secondary road programs without reference to Washington; issuing advisory memoranda on land acquisition and application of labor laws; cooperation in studies now under way (with the help of AASHO and the Automotive Safety Foundation); streamlining of bureau internal operations.

Winding up their meeting on Friday, the highway officials watched the seating of W. A. Bugge (ENR, Nov. 29, p. 54), Washington state highway engineer, as new president of the organization, succeeding Rex M. Whitton of Missouri.

Pyke Johnson, former Colorado state highway engineer and also a former president of the Automotive Safety Foundation, was recipient of the annual Bartlett Award for outstanding service to the cause of highways.

In a concurrent session, members of the National Good Roads Association named the following slate of officers for the coming year: President, J. Anton Hagios of Newark, N. J.; Vice Presidents, Edward Konkol, Madison, Wis., and Gerald Bogan, Des Moines, Iowa.

Speakers at AASHO sessions see . . .

Wide Use of Electronics in Highways

Electronics—in the form of computers, radio communication, traffic monitoring by television and radar, radio-controlled traffic signals and weighing mechanisms—gained further recognition as a major aid in prosecution of the grand plan for highways at last week's AASHO meeting.

Electronic computers continued to hold the spotlight as the work in bridge design of perhaps the leading computer user in the civil engineering field, American Bridge Division of U. S. Steel Corp., was revealed in some detail. C. W. Zahler, who has headed the erector's computer division since its inception about five years ago, described his division's success in computing stresses in trusses, rigid frames, continuous spans, and arches; stress and temperature deflections; influence lines for tied arches; wind stresses and hyperbolic functions to solve a catenary.

• Structural Design

Zahler stated that mechanized computation saves about 75% of the cost of equivalent manual calculations. But he implied that time and manpower savings may be secondary to resultant construction savings through more refined design. Electronic computation of indeterminate structures, for example, permits return to more precise formulas or the fundamental theories which today have been largely discarded in favor of less cumbersome approximate methods that are faster for manual calculation. In one computation for a tied arch, the approximate method was found to be in error by 10%.

Zahler also laid down some ground rules for getting into computer operations. He has employed civil engineers exclusively for all phases of computer operation—for determining feasibility of the application, blocking out the formulas and finally preparing the actual instructions to the computer. It is much easier, he believes, to familiarize an engineer with the vernacular of computers than to reverse the procedure for a mathematician or computer expert.

The chief determinant of an application's feasibility is the number of repetitions. Zahler described in detail to an avidly interested audience a program for cantilever-truss design. This one program alone will solve about 99% of the framed structure of this type regardless of number of panels, loads, dimensions or web system. Data required are dimensions and loads at panel points and the type of truss. The computer calculates stresses in all members and checks its own work, requiring about six minutes for a 500-ft Warren-type cantilever truss. But this particular program required some four man-months to prepare. It is economical for American Bridge since it has been applied thousands of times.

• Highway Design,

E. S. Preston of Ohio got into actual highway design with a description of progress towards achieving just about the foreseeable ultimate in mechanized design. Cross-section information would be picked off say a 2-ft contour map compiled from aerial photographs by a plotter which would feed directly into an electronic computer to yield earthwork, slope stake and other design data. In addition, information from the plotter would be flashed onto an oscilloscope in the form of a pictorial representation of the final cross-section, and photographic reproductions would be used as final contract drawings.

The Ohio Department of Highways is well on its way to perfecting the missing links in this operation—the conversion mechanisms from plotter to computer and electron tube.

That the computer aspect of the operation is well in hand was shown by several leading users. In his paper, S. Osofsky documented with figures California's success in computing traverse closures and advance design and pay earthwork quantities. Since last May traverse computations for area with adjustments have averaged 5 cents a course, compared to 13 cents when done (but not checked) manually. Although earthwork calculation costs have averaged $50 per mile, a comparison with conventional methods is difficult to make since there is no typical section of highway.

California is also using computers in design of curved bridges to locate centerlines to determine minimum span, to analyze rectangular columns under biaxial bending and for design of composite beams. Reinforcing steel quantities are also taken off, and the state will soon have a program to fix points on aerial photographs, thereby eliminating a certain amount of field surveying.

The computer section is organized so that traverse computations are returned to the field 1½ days after the field data are submitted. Service on an average earthwork project, for varying lengths of highway, requires about a week. The office has handled up to 500 miles of earthwork computation in a month.

After more than a year's use of computers, Arizona finds it takes about three minutes of actual working time to transform field surveying notes into earthwork volumes, or about 10 hours per mile of highway. The computer group, under Glen Ryden, also has completed, but not tested, programs for concrete-beam deflection and soil-screen analysis. The latter yields total weight retained and percentages retained and passing.

Illinois has just about completed its earthwork program and a field-to-computer office arrangement that points up the possibility of more economical construction. The field will provide a number of geometrically correct gradelines and earthwork volumes will be computed for all of them.

• Program Library

The time required for programming and the possibilities of saving some of this time by interchange of information between states were emphasized by several speakers. In answer, H. A. Radzikowski, secretary of the AASHO committee on radio and electronics and one of the leading advocates of computer use, promised AASHO action on a program library. Already, users of IBM computers have formed a share-the-program group. Programs for one type of computer must be modified extensively for use in other types and makes, but at least the approaches can be salvaged for a saving.

The other end of completely mechanized highway computation—obtaining spot elevations from photogrammetric contour maps—was discussed by George McDonald of Lockwood, Kessler & Bartlett, Inc., Syosset, N. Y. For a stretch of 4,000 ft in flat Long Island, comparative earthwork quantities obtained from field work and with an A-5 plotter were 134,800 and 138,900 cu yd, respectively. And indications were that the photogrammetric result was closer to the true result.

• Radio

Two-way mobile radio received considerable praise from several recent users at last week's meeting, but the important news was a renewed drive by AASHO for greater recognition of highway and traffic control needs by the Federal Communications Commission when radio frequency allocations are made. Latest statistics on mobile radio use in connection with highways show 340 users including 40 state highway departments. Over a recent 12-month period, investment in mobile radio facilities increased 34% to a current $12.7 million total.

Radio of the one-way fixed variety as it is used in Chicago for control of traffic light signals was described by Ralph Michel, the city's associate traffic engineer. Now used at 13 signals, the system basically substitutes radio for cables to control the signal's controller.

Its main advantage lies in that paving does not have to be torn up to install the cables.

The other half of an effort to improve signal control—gathering traffic flow data—was set forth by Henry Barnes, director of traffic for Baltimore. That city is now installing $1 million worth of radar traffic-detection cones that will feed vehicle flow information to a complex system of electronic controllers which will select signal timing for 365 intersections.

The radar detection apparatus looks like a wastepaper basket suspended over a street. The controllers analyze information from a number of radar cones and automatically select the best signal timing over a particular zone. In Baltimore, master controller output is being transmitted to traffic lights by cable. The controllers re-compute signal timing every six minutes and pick from over 220 timing possibilities.

Still another electronic method for traffic control—by television surveillance—was recently tried out in the City of Detroit.

A. F. Malo, director of traffic, and several equipment manufacturers aimed three TV cameras at points along two expressways and monitored the pictures at a central location. Several times over a three-month period, police were directed by the TV crew to traffic accidents or stoppages much sooner than ordinarily.

Malo felt that via instantly controlled signs along the expressways and at access points, stoppages and slowups could be eased through directions given by TV monitors.

Right now though, Malo is trying to gain financial backing for a full-scale test of TV for expressway control—33 cameras along 14 miles of Detroit freeway, with appurtenances to cost about $17 million.

Recent experiences with electronic scales for weighing moving vehicles were summarized by D. K. Normann of the Bureau of Public Roads. Accurate measurements are reported to have been obtained for trucks moving as fast as 55 mph, the scales yielding impact weights rather than true static weights.

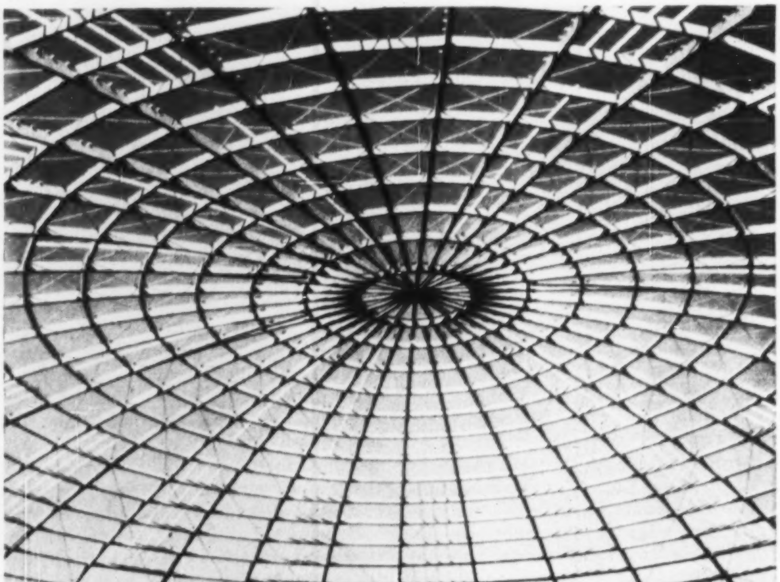
Thus, aside from detecting overloaded trucks (weighing made accurate by smooth approaches), the electronic scales are seen having application in highway research by measuring impact loads precisely on surfaces of varying degrees of roughness.

While all of the foregoing applications of electronics have been realized or are almost at hand, last week's highway meeting produced one long look into the future. William Halstead of the Telecarrier Corp., New York, described the possibilities of inductance radio.

This is a system wherein voltage through a wire along a highway induces controlled-range (15 to 100 ft radius) radio waves which would be picked up by an ordinary car radio.

Because of its short range, the system would avoid channel allocation difficulties plaguing ordinary, or space, radio. It is also applicable in tunnels where space radio waves can't reach.

The system is technically feasible and has actually been used successfully. However, it would be competing for the motorists' attention usually against several ordinary type radio stations and would merely be replacing road signs when carrying traffic information.



Glulam Arches Frame 300-ft Dome

Gigantic spider web is glue-laminated timber framework for a 300-ft diameter dome, the biggest yet built in wood. The structure will support the roof of Montana State College's new $1.5-million fieldhouse in Bozeman.

Thirty-six arched ribs rise from 39-ft high walls and frame into a compression ring 90 ft above the ground. Timber beams in concentric circles about the high point brace the ribs laterally and also support purlins on which the roof deck will be laid.

Fred Willson and Oswald Berg, Jr., Bozeman architects, designed the fieldhouse. Ben F. Hurlbutt of Billings is the structural engineer. Haggerty & Messner, Bozeman, is the general contractor. The dome members were laminated, fabricated and erected by Timber Structures, Inc., of Portland, Ore.

1959's civilian jet airliners are . . .

A Boost for Airport Work

Airport construction has received another push with announcement by the Civil Aeronautics Administration of award of a $9-million contract for installation of 23 long-range radar stations across the country.

The new radar units will be able to track 600-mph aircraft in a 200-mi radius at altitudes up to 70,000 ft in all kinds of weather.

According to CAA representatives, installation of the stations is one more step in the government's three-year program for a $240-million modernization of U.S. airways in preparation for introduction of civil jet airliners in 1959.

• Aside from federal aid—This expenditure is not a part of the $500-million, four-year program of federal aid that was approved by Congress last year (ENR July 28, 1955, p. 21). That program is still moving ahead with more than 380 airport projects involving more than $115 million on the books.

Among cities that are receiving federal aid under the matching fund program are New Orleans, New York City, Atlanta, Los Angeles and Chicago. The federal and matching funds are being used in all phases of airport construction from runways to site preparation (ENR June 21, p. 112).

• Air National Guard active—First in a recently announced $10.6-million plan for construction of a new municipal airport for Jackson, Miss., will be development of Air National Guard facilities, which will cost $3.8 million. National Guard construction will be limited to the northern end of a new instrument runway, where all facilities for operation of a squadron will be installed to serve the area.

The airport, six miles east of the Jackson city line (about 13 minutes driving time), ultimately will have three paved runways, two of these will comprise a parallel system and a third will serve as a crosswind strip.

Passenger facilities will include a terminal designed to accommodate traffic expected at the field in 1965, three hangars for aircraft maintenance and storage of overflaw traffic, and six "multiple T-type" hangars to provide storage space for 60 planes.

According to R. Baxter Wilson, chairman of the city's Airport Commission, two studies resulted in the decision to develop the new site rather than try to improve existing facilities of Hawkins Field, the present municipal airport.

The first study was conducted by the President's Airport Use Panel, composed of representatives from military and civil air operations. Results of this study indicated that existing facilities, including planned improvements, are not adequate to meet both civil and military aviation requirements. But it also was pointed out that growing residential areas near Hawkins Field would be an increasing problem in the future.

Following this study, the commission requested Michael Baker, Jr., Inc., consultants, to complete a site analysis and economic study. This report, begun in March and just completed, shows that a location in Rankin County would be the most feasible solution for long-range development in the Jackson area.

The new airport will be financed jointly by the city, the Mississippi Air National Guard and the federal airport program. Construction of the National Guard facilities will start around mid 1957. And since this is only the first stage of a three-part program, all financing of improvements necessary to carry on operations at Hawkins Field will be taken from airport revenues.

• Other National Guard aid—A $1.8-million contract has been awarded for construction of new facilities for the Kentucky Air National Guard at Standiford Field at Louisville.

According to Lt. Col. G. R. Tylor, district executive officer of the Army Corps of Engineers, new facilities will include a steel-frame aircraft hangar and boilerhouse, a supply and armament storage building, a motor service shop, storage space for inflammables, a crash truck station, fuel storage facilities, a 600-ft concrete apron for aircraft parking taxiways, roadways, fencing, seeding, utility lines and drainage.

Construction is scheduled to begin Dec. 15 and plans call for completion by the summer of 1958.

The Air National Guard for the area now rents space at the southern end of Standiford Field, from the Louisville & Jefferson County Air Board. The new facilities will be located on newly acquired property that is adjacent to the field.

Another Kentucky city, Frankfort, is the scene of still more airport contract activity. A low bid has been received for construction of an Air National Guard maintenance shop at the Capital City Airport. The shop, which will provide 25,000 sq ft, will be completed in about 15 months and is part of a building program under way since last summer. The site, which will be the logistic center for the State National Guard, already has construction progressing on an armory and aircraft hangar.

Counties Propose Sewerage Master Plan

A $27-million sewage-works program has been proposed for the Portland, Ore., suburban area. The master plan was prepared for Clackamas, Multnomah and Washington Counties by Stevens & Thompson, consulting engineers of Portland, Ore.

Cooperation of three counties in such a survey is unusual, if not unique.

The wide area under study straddles the Willamette River and includes all of a growing suburban area that is expected to have substantial population—ultimate population is forecast as 309,000 in 65 sq mi west of the river and 278,000 85 sq mi east of the river. It also includes some west-slope areas of Portland.

Present service is provided by septic tanks or small sewerage systems. The report points out that some areas are limited in development due to the septic tanks and may even become public health hazards. And the small treatment plants serving other areas are in danger of being overloaded or of suffering from inefficient, costly operation. These conditions may lead to contamination of recreational streams and lakes, the report points out.

• Single Plant—The proposed system centers around a treatment plant at Oswego on the Willamette River that will ultimately reach 65-mgd capacity and cost $10 million. And to protect quality of the river that passes through Portland, the plant will have to have secondary treatment—most likely the activated sludge process.

Leading to the plant would be a system of 6 interceptors and 30 trunk sewers. Location of the plant and layout of the system is based on the desireability of gravity flow. Only one major pumping plant is required—that is an 85-mgd unit needed to pump sewage from east of the Willamette under the river to the plant. The program does not include lateral sewers and house connections which might total in cost as much or more than the main trunks and treatment works.

To implement the master plan the three counties are expected to ask the 1957 Oregon legislature for laws that will permit establishment of an overall agency. And, of course, standards would have to be established to facilitate connecting local or interim systems to the master plan.

Trouble Over Tolls

New Jersey still blocks Delaware crossing plans

Until New Jersey and Delaware can get together on financial arrangements, there will be no new bridge between the two states. Plans for construction of another span across the Delaware River—needed by 1960 if traffic estimates for Delaware Memorial Bridge are correct—are currently being blocked by New Jersey's demand for toll free passage in the near future.

As matters now stand, Delaware receives all the tolls collected on Delaware Memorial Bridge. New Jersey's objection to indefinite continuation of this procedure stems from the fact that, by actual count, New Jersey residents pay three times as much in toll revenues as do Delaware drivers.

Last year, Delaware vainly sought Congressional approval of a plan for refinancing the present bridge and continuing its tolls indefinitely in order to build feeder roads and the new bridge. The plan was rejected by Congress because of New Jersey opposition—an opposition that still exists.

In his most recent letter to the Delaware Highway Department, Dwight R. C. Palmer, New Jersey Highway Commissioner, stated: "We wish to make New Jersey's position perfectly clear . . . we are unwilling to support a continuation of the Delaware Memorial Bridge as a toll bridge beyond the period in which its bonds could be retired from tolls taken. Nor could we support the diversion of tolls for the purpose of constructing highway for the state of Delaware or of combining tolls of the existing bridge with those of a new structure, continuing collections on both for the life of any bond issue for a new bridge."

According to Palmer, New Jersey will withdraw its objections to refinancing the present bridge only if Delaware agrees to:

- Continue to collect tolls for the purpose of paying off bond-holders as rapidly as possible. (Since the bridge is already more than one-third paid for, the bonds should be retired by 1960 or 1961.)
- Continue to collect tolls thereafter only until it has sufficient money to put up 10% of the cost of the new bridge. (Palmer insists that the new bridge be incorporated in the Federal Highway program. This means that the federal government will put up the remaining 90%.)
- Thereafter declare both bridges toll free.

The Delaware State Highway Department's Chief Engineer, Richard A. Haber, has flatly rejected the New Jersey proposals. Although the State's Interstate Highway Division, administrators of the present bridge, have indicated a willingness to negotiate, Haber contends that the New Jersey plan is unfair in that it ignores $3 million a year in bridge maintenance charges. In the absence of tolls this money must come out of the state's general fund. With 80% of the vehicles using the bridge coming from out of state, the assumption of the maintenance charges by the taxpayers of Delaware is inequitable. As an equally important objection to New Jersey's proposal, Haber points out that if it is adopted Delaware would spend practically all of its federal interstate highway allotment just for the new bridge.

Dam Proposed

Structure on Lewis River would be earthfill with blanket—cost $34 million

License application for the Muddy Project on the Lewis River was filed last week by Pacific Power & Light Co. with the Federal Power Commission in a move to get the $34 million project out of the planning stage. The third in the company's postwar hydroelectric projects on the southwestern Washington River, Muddy would have a rated generating capacity of 110,000 kw.

Muddy would rise at the head of the reservoir impounded by Swift Dam, now under construction. The main structure would be 280 ft high above stream bed and 1,600 ft long and of earthfill construction. A 30-ft high wing dam will extend another 5,800 ft. The main structure would create an 8-mi long pool. In addition a 55-ft high, 270-ft long dam will be erected to divert flow of Pine Creek through a mile long canal into the Muddy Reservoir.

Construction of the dam calls for an earth blanket on the bottom of the reservoir area, reaching 2,000 ft upstream from the dam, instead of the more conventional vertical cutoff.

Robert Delucia, chief engineer, reports, the powerhouse installation will involve two 55,000-kw nameplate generators and the turbines will be 88,000-hp Francis type of 180 rpm to harness the 300 ft of head.

Work schedule calls for roads, camps, communications facilities and clearing and construction power to start late in 1959. The power plant would be in full operation by the end of 1963.

The Muddy Development is being undertaken within an agreement with Cowlitz County (Wash.) PUD for joint development of the Lewis.

Tax Troubles

Baltimore firms threaten to curtail construction plans

Baltimore manufacturers have threatened to halt plant expansion plans if the municipal government imposes a property tax on their inventories, machinery and equipment.

Baltimore's current tax rate is $3.13 per $100 of assessed valuation. If the tax structure remains unchanged, the rate would go up to $3.34 to support the 1957 budget.

But, if the city's long-standing exemptions for manufacturer's machinery and inventories are lifted, the city would gain an additional $13 million revenues and the property tax rate could be reduced to $2.84, according to budget estimaters.

The D'Alesandro proposal touched off a storm of protest, not only from manufacturers, but realtors, organized labor, shipping firms and bankers.

Manufacturers' warnings were blunt: If the tax is imposed, they will halt multi-million dollar expansion programs; some will move to cities "with a more favorable tax climate."

Businessmen say that more than current expansion programs are endangered. At stake, also, is the city's long-term, $900-million urban renewal program, they assert.

Association of commerce spokesmen, appearing before a special City Council hearing, stressed these points:

- Tax relief given to home owners under this plan would be temporary. If some businesses left Baltimore because of the tax, the city's tax bases would be narrowed and home owners would be faced with higher tax rates than now.
- The city's ambitious $900 million, 20-year urban renewal program is based in part on steady industrial growth. An exodus of industry, businessmen argue, would extend blight. Many sections, they contend, can be rebuilt only by replacing slums with industrial plants. And, a broad tax base is necessary to finance an urban renewal program of this size.
- Other sections of the nation, both rural and urban, are successfully attracting industry. Baltimore can't compete if business faces high taxes, these spokesmen say.

Against these arguments, some city councilmen contend that other cities which tax inventories and equipment are currently enjoying industrial expansion. And, councilmen say that the tax question is only one of many that industry considers in choosing a new plant location.

The City Council must act on the controversial measure sometime this month.

Skyline Addition

Skyscraper will be eighth tallest in New York City

New York's midtown skyline will get the tallest addition since the early 1930's, according to plans made public last week. A new 60-story office building will be built on the west side of the Avenue of the Americas between 51st and 52nd St.

The $60-million structure will rise 775 ft. Only six buildings in the city are taller. Construction of a seventh, however will begin shortly.

Existing buildings taller than the new skyscraper are: Empire State Building 1,250 ft; Chrysler Building, 1,046 ft; 60 Wall Tower, 950 ft; Bank of the Manhattan Co.'s old home office, 927 ft; RCA Building, 850 ft; and the Woolworth Building, 792 ft.

The most recently constructed of the six, the RCA Building, went up 25 years ago. The foundation contract for a seventh, however—Chase Manhattan Bank's 60-story, 800-ft-high home office building—may be awarded this week.

The outer surface of the new Avenue of the Americas structure will be stainless steel, similar to that of the newly completed 45-story Socony Mobil Building (ENR Feb. 9, p. 33). Owners of both buildings are Peter B. Ruffin and John W. Galbreath.

Office space will total 1.7 million sq ft; gross area will exceed 2 million sq ft. The site area is 100,000 sq ft, including the entire block front on the Avenue of the Americas. On this side, a 40-ft-deep area for planting will be left between the building and the street.

Three side setbacks will occur at and below the 15th floor. Above that level, the structure will consist of a 104x215-ft tower.

Supporting columns will be located at the perimeter of the tower and at the elevator core. Office spaces, except for the topmost floors, will be column free.

The building will be riveted steel frame construction. Shear loads will be resisted by the frame.

Vertical traffic will be handled by 38 electronically controlled elevators, operating at speeds up to 1,400 fpm, and by two moving stairs, connecting the ground floor with a concourse of stores and restaurants.

Demolition on the site will begin next week. Completion of the building is scheduled for the spring of 1960.

Architects are Harrison & Abramovitz; structural engineers, Edwards & Hjorth; mechanical engineers, Jaros, Baum & Bolles; electrical engineer, Edward E. Ashley. Turner Construction Co. is the general contractor. All are New York firms.

Honored for Brilliant Career

Ralph Budd, (left) civil engineer, transport pioneer and railroad president was honored by the American Institute of Consulting Engineers with its Award of Merit last week at the annual banquet at which Harlow H. Curtice (right), president of General Motors Corp., was the speaker.

Famous as a railroad president—of the Great Northern 1921-1932, and Burlington, 1932-1949—Budd also made important construction history. As chief engineer of the Panama Railroad, 1906-1909 he rehabilitated the old line so that the Panama Canal could be built. And as president of the Great Northern he built the 8-mile Cascade Tunnel, relocated 43 miles of the line and electrified the Cascade Mountain Division. To his credit are also the first diesel-powered streamlined train and the Vista Dome cars.

After Budd retired as Burlington president at the age of 70, he served as chairman of the Chicago Transit Authority for five years, another job of civil engineering significance.

Barker Elected President By Engineers Joint Council

Joseph W. Barker was elected president of Engineers Joint Council for 1957 at the November meeting of the board of directors. Barker, chairman of the board and president of Research Corp., will take office in January, heading an organization that represents 200,000 engineers. He replaces Thomas H. Chilton, E. I. du Pont de Nemours.

Barker is a member of the American Society of Mechanical Engineers, American Institute of Electrical Engineers, American Society of Chemical Engineers, American Institute of Mining and Metallurgical Engineers and the American Society for Engineering Education.

An electrical engineering graduate of MIT, Barker was professor at that school and at Lehigh University, and later dean of engineering at Columbia University. He left Columbia to serve as special assistant to the Secretary of the Navy from 1941 to 1945. In 1945 he became president of Research Corp.

Fischer S. Black, publisher and editor of Electrical World, a McGraw-Hill publication, was elected vice president of EJC at the same meeting. Since 1945, Black has been active in various capacities with the American Institute of Electrical Engineers.

General Lewis A. Pick Dies, Was Chief of Army Engineers

Lt. Gen. Lewis A. Pick, 66, died Dec. 2. Retired since 1953 after his four-year term as Chief of Army Engineers, General Pick had been active in engineering and industrial development work in Alabama until illness had him hospitalized last month.

General Pick's fame will be as lasting as the memory of two great accomplishments that go into history bearing his name. First, there was "Pick's Pike," the 478-mile Ledo Road from India, across Burma, and to China as vital communication line in that theatre of operations during World War II. Second, General Pick is credited as co-author of the Pick-Sloan Plan for basinwide development of the Missouri River and its tributaries, in an area covering one-sixth of the U. S.

"Pick's Pike" went through 270 miles of virgin jungle in a hostile country that was cleared of Japanese by General Stillwell's fighting forces just ahead of General Pick's 45,000-man construction force.

The Pick-Sloan Plan, in contrast to his emergency effort in Burma, is the full and unhurried thinking of Corps of Engineer forces under General Pick as Missouri River Division Engineer. It prescribed basinwide control in coordination with Bureau of Reclamation interests in the vast area.

In March 1949, Pick became Chief of Engineers, and in his term in that post capped a 36-year career in the Army Engineers.

First State Wins Approval On Use of U. S. Road Funds

Maryland has become the first state to receive final approval by the federal government for use of its entire allotment of 1957 federal highway funds.

Under the terms of the highway program, the state will receive $12 million next year. The funds will be used on six projects, four of which are now under contract. Three of the projects are segments of the Baltimore circumferential belt system that will help remove the notorious "Baltimore Bottle-neck," main obstruction in the principal North-South arterial route.

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A Steel Curtain

Norfolk seawall planned for hurricane protection

The Corps of Engineers has projected a preliminary idea for a $2.3-million seawall for downtown Norfolk, Va., to protect the business section of that city against high tides in time of hurricanes or northeast storms.

The Engineers conceive a half-mile long, steel-sheetpile wall, capped with concrete, to protect the southwest part of the business section. The wall would have seven 30-ft gates to be closed in time of danger.

The Norfolk office of the Corps of Engineers has asked for authority to make a detailed study of the problem. The preliminary draft of the proposed protective wall calls for a structure 1½ ft above record high water in the hurricane of Aug. 23, 1933.

The Engineers, if given the authority, expect to complete their study by June 30, 1957. Who would pay for the seawall is a matter to be determined. The Norfolk City Council, in asking for the study, also raised the possibilities of federal aid in the construction.

To date there has been no consideration by Congress of financing this particular project. In 1955, however, Congress authorized a study of hurricane problems in the southeast states and the Corps of Engineers has proceeded under that authorization.

Street-Blocking Regulations Are Reported in APWA Study

With space at a premium, building contractors working within city limits often are forced to use adjacent streets and sidewalks for the storage of materials and equipment. To check on urban regulations pertaining to contractors' use of public rights-of-way, the American Public Works Association recently surveyed 39 cities with populations over 170,000.

The report indicates that almost all cities allow some use of these areas for storage of construction materials and machinery. Baltimore is the only reporting city that does not allow any such use of a public street. Philadelphia permits the use of an area 8 ft from the curb, except in the central business district where no street or sidewalk storage is allowed.

With respect to sidewalks, 24 responding cities permit the use of the entire sidewalk, while the others specify the number of feet or percentage of walk available.

Twenty-seven of the cities require contractors to pay fees for the use of public property. Variations include working permits after 30 or 60 days or obtaining a special permit for each separate installation.

The fees in seven cities vary with the location and several require deposits or surety bonds. In 10 of the reporting cities, approval of traffic authorities is needed before permits are given to the contractors.

Bids Sought on Seadrome For San Diego Navy Base

Bids on the first-phase construction of a Navy seadrome for jet seaplanes in the south bay area of San Diego harbor will be taken in March, 1957.

An allocation of $5 million has been made for the initial work, including dredging of about 5 million cu yd of bay bottom and the construction of 3,200 ft of sheet pile bulkhead as a retaining wall.

This first phase, expected to be under way by April, should be completed in October, 1958.

Overall cost of the entire seadrome project is not known, since Congress has allocated funds for only the first increment.

Next year, however, Congress is expected to provide for additional dredging, bulkhead construction, ramps and shore facilities.

The seadrome, designed to lessen present seaplane operation in the main harbor will be located in San Diego Bay opposite National City and Chula Vista and adjacent to the Silver Strand that extends south from Coronado.

Its operating area will be 20,000 ft by 3,000 ft in addition to the shore access area.

Truck Tolls Are Scheduled For Florida 'Pike Section

A complete schedule of truck toll charges on the 120-mile Miami to Fort Pierce section of the Sunshine State Parkway has been announced.

Charges for various classifications are as follows:

- Class 2—Trucks and busses with two axle, dual rears, with a maximum of six tires—$3.75.
- Class 3—Three axle, single unit trucks; three axle tractor trailer combinations; three axle busses, all with a maximum of ten tires—$4.30.
- Class 4—Four axle tractor trailer, semi-trailer or truck trailer combinations, and two axle house trailers including pulling vehicles, all with a maximum of 14 tires—$5.00.
- Class 5—Five axle tractor-semi-trailer or truck trailer combinations, three axle house trailers including pulling vehicle—$6.00.
- Class 6—Single axle semi, or utility trailer—the pulling vehicle takes its own classification while the trailer is covered by the Class 6 ticket.

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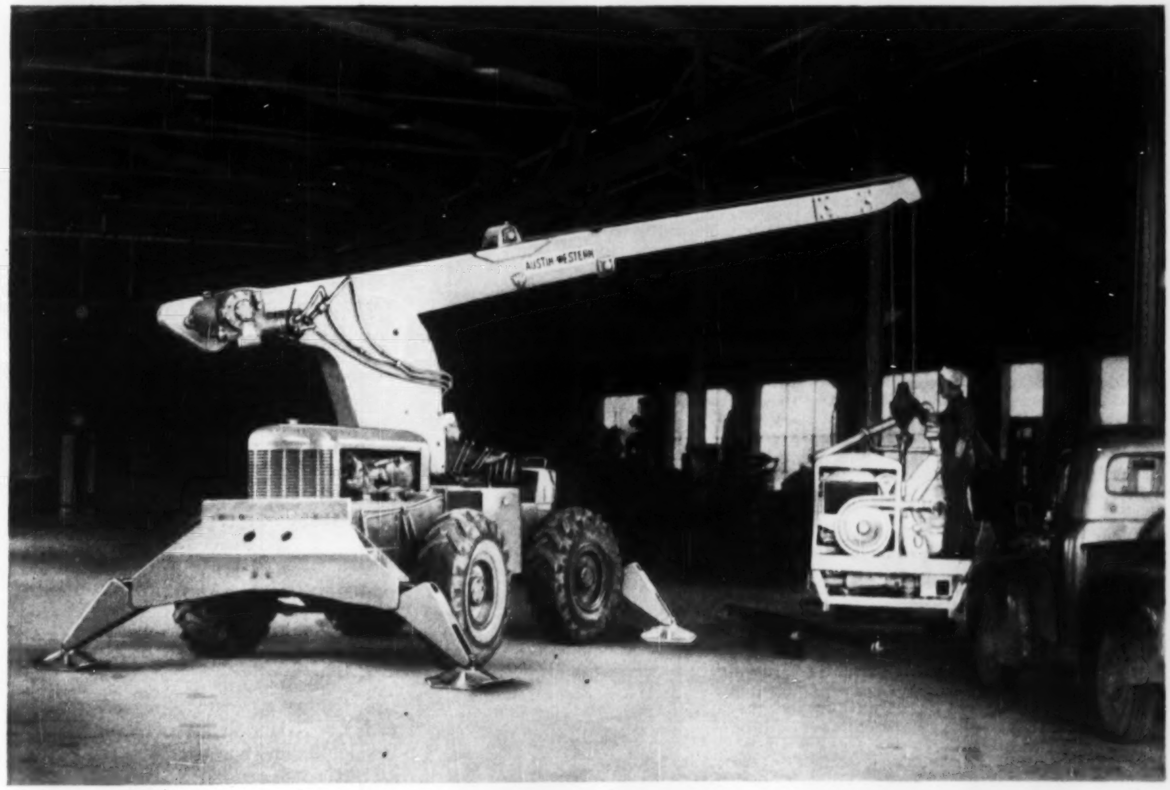

"Our hydraulic crane is a service unit which, therefore, should be available at all hours, to lower the downtime on more expensive equipment and save the time of our own and our copartners' gangs of men on a job."

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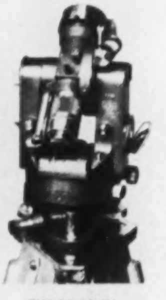

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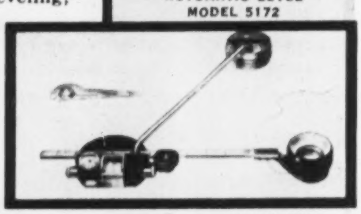

PLANIMETER MODEL 236-A

New Schools Promise Supply Of Engineers, Technicians

Engineering courses to be offered at Charlotte College, Charlotte, N. C., could be the nucleus of an engineering school for that city, according to Dean J. H. Lampe of the North Carolina State College School of Engineering. And, with the state needing 5,400 technicians a year for the next five years, he points out that the new school—plus similar institutions proposed at Wilmington and Asheville—will help to fill this need.

Starting in January, four courses will be taught in night sessions at Charlotte College—with eventual expansion to seven courses. The embryo school will function on a "post-graduate" basis at first, but later it will be possible to work for engineering degrees.

Although most of the students will be engineers, classes will be open to some who could benefit from the courses, though they will receive no credits.

North Carolina State College will give engineers full credit for classes.

Dean Lampe believes that the proposed school will work well with Charlotte College and with a plan to set up a technical institute in Charlotte.

County Approval Clears Path For Airport Expansion Plan

Formal approval by county officials this week has cleared the way for an early 1957 start on a $10-million expansion program for the Detroit-Wayne airport.

The Wayne County Road Commission, which is handling administration of the project, approved a low bid of $1.5 million submitted by A. J. Etkin Construction Co. for construction of a hangar, ten other bidders had submitted tenders on the job.

Next April bids will be sought on first-phase construction of a $6-million terminal (ENR, Nov. 15, p. 29). Other work will include an air freight terminal.

World Conference Slated On Prestressed Concrete

The Prestressed Concrete Institute is planning to combine its 3rd Annual Meeting with a World Conference on Prestressed Concrete. The sessions will be presented by PCI and the University of California.

The meeting will be held the week of July 29, 1957, at the Fairmont Hotel in San Francisco. Preliminary plans were prepared by Prof. T. Y. Lin of the university.

The PCI has its headquarters at 425 N. E. 5th St., Boca Raton, Fla.

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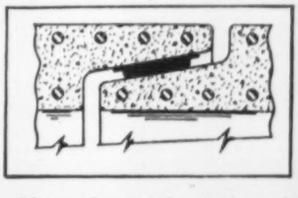
PROJECT: Villard Avenue sanitary sewers, for Bureau of Sewers, Department of Public Works, Milwaukee, Wisconsin.

ENGINEERS: Lloyd D. Knapp, City Engineer; Edmund Hirsch, Engineer in charge of Sewer Construction Division; Ted Prawdzik, Chief Design Engineer; and Walter Schmitz, Construction Engineer.

PIPE: 21" and 24" reinforced concrete pipe, furnished by Waukesha Cement Tile Co., Waukesha, Wisconsin.

CONTRACTOR: W. J. Lazynski, Inc., Milwaukee, Wis.



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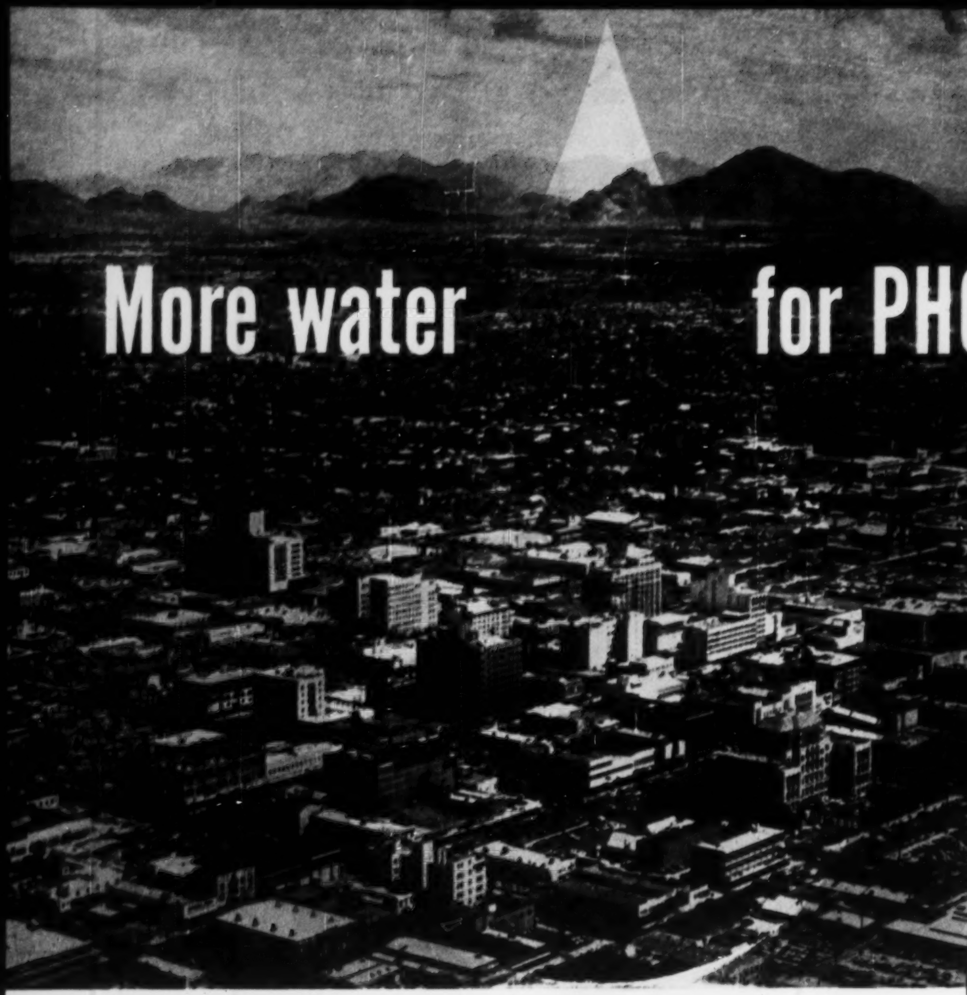
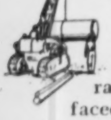


Another city *using* AMERICAN'S *reinforced concrete pressure pipe for water supply lines*



The City of Phoenix, Arizona is another of the rapidly growing cities of the Southwest which have faced tremendous water supply problems and have met them successfully. The population of Greater Phoenix has increased almost 50 per cent in the past five years. An annexation program is currently increasing the rapid expansion of the City of Phoenix which is one of the fastest growing cities in the nation.

During 1953 American Pipe and Construction Company, through Fisher Contracting Company, general contractors, supplied Phoenix with more than 37,000 feet of large diameter concrete pressure pipe for a line which increased the Phoenix primary feeder capacity from 100,000,000 MGD to 210,000,000 MGD. The pipe furnished was pre-stressed concrete cylinder pipe designed for the operating pressures established under specifications prepared by Yost & Gardner, consulting engineers for the City of Phoenix.

American has helped to meet the special problems faced by Phoenix water officials by designing and supplying reinforced concrete pressure pipe especially for conditions in the Phoenix area.

A recent merger with Hooper Concrete Pipe Company in Phoenix gives American another permanent plant from which to serve the cities of the Southwest.

American Pipe and Construction Company makes available 49 years of experience and extensive production facilities to help solve any water supply problem. There is a type of American pipe to meet any requirement. Write or phone for complete information.

5600

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Concrete pipe for main water supply lines, storm and sanitary sewers, subaqueous lines

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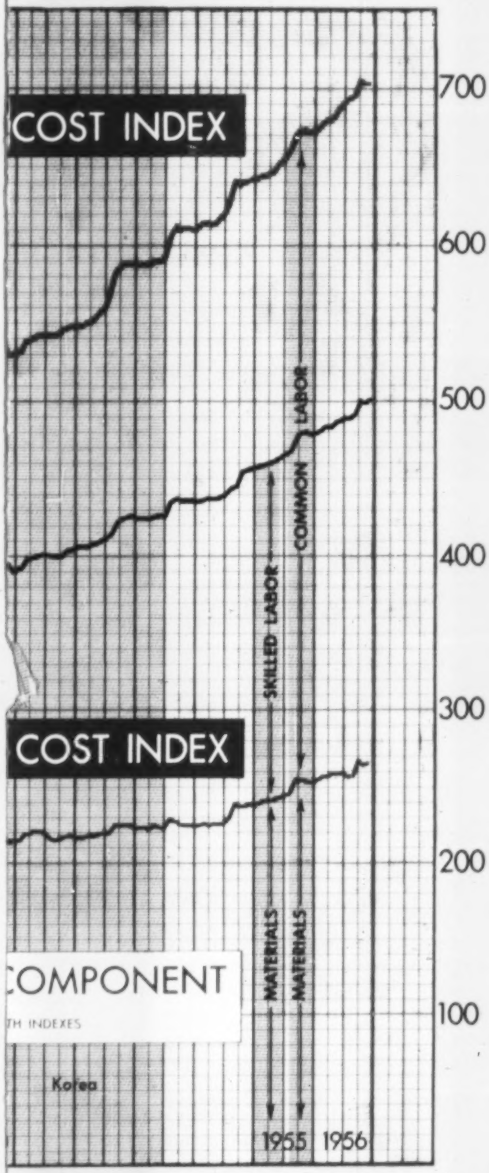
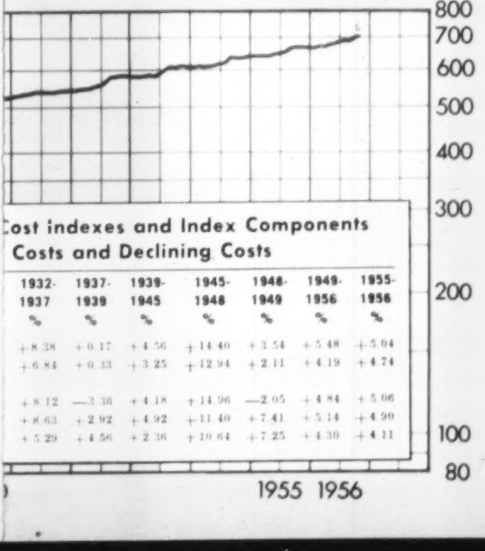
Main offices and plant:
4635 Firestone Blvd., South Gate, Calif., Phone LOrain 4-2511

District sales offices and plants:
Hayward and San Diego, Calif., Portland, Ore., Phoenix, Ariz.

Measured by Engineering News-Record





Cost indexes and Index Components
Costs and Declining Costs

1932-1937 %	1937-1939 %	1939-1945 %	1945-1948 %	1948-1949 %	1949-1956 %	1955-1956 %
+8.38	+0.17	+4.56	+14.40	+3.54	+5.48	+5.04
+6.84	+0.33	+3.25	+12.94	+2.11	+4.19	+4.74
+8.12	—3.36	+4.18	+14.96	—2.05	+4.84	+5.06
+8.63	+2.92	+4.92	+11.40	+7.41	+5.14	+4.90
+5.29	+4.56	+2.36	+10.64	+7.25	+4.30	+4.11

CONSTRUCTION AND BUILDING COST INDEXES

THE ENGINEERING NEWS-RECORD Construction Cost Index was established in 1921, based on price movements in structural steel, portland cement, lumber and common labor. The Building Cost Index was introduced in 1938 to measure also the effect of skilled wage trends on costs. It uses the same materials as those in the construction cost index but skilled labor, instead of common labor.

A few minor changes have been made in these indexes over the years necessitated by changed conditions in the market. These are recorded in full in ENR, September 1, 1949, page 398, together with a complete history of the development and use of these indexes. New values originally reported monthly at the beginning of each month have also been reported each week beginning July, 1954.

Both indexes are based on 1913=100 but are reported also each week on 1926=100 and 1949=100 bases. These are weighted aggregative indexes, thus base years can be shifted at will.

ENR Construction and Building Cost Indexes reflect wage rate and material price trends. They do not adjust for labor or job efficiency, materials availability, competitive conditions, management, mechanization or other "intangibles" affecting construction costs.

- **A hypothetical block of construction** requiring 6 bbls of cement, 1.088 M ft bm of lumber, 2,500 lbs of steel and 200 hrs of common labor is used in the **Construction Cost Index** to measure the trend of the cost of heavy construction.
- **A similar hypothetical block of construction** using the same quantities of materials, but 68.38 hrs of skilled labor is the basis for computing the **Building Cost Index.**

This simple structure was adopted to facilitate prompt reporting of changes due to price and wage rate movements, both as to direction and degree.

Both indexes have proved, over the years, infallible as to direction and, in normal times, accurate as to degree. Under abnormal conditions of increasing or decreasing job productivity, allowance for the "intangibles" listed above should be made in measuring the degree of change in overall completion costs, or in construction selling price trends.

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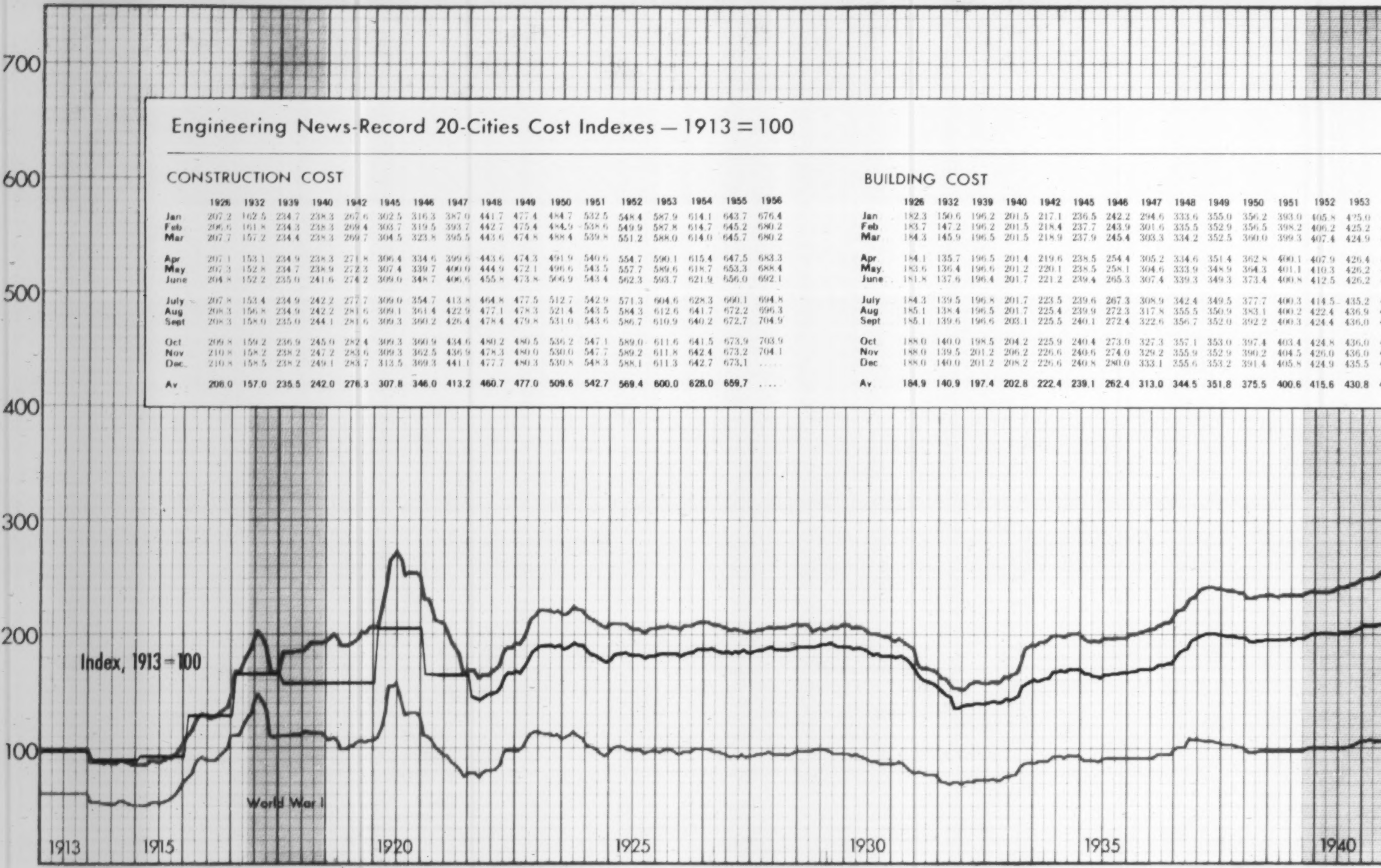
ENR Cost Indexes in 21 Cities • • • ➡

Longest Upswing in 43 Years More Than Doubles Construction Costs



Engineering News-Record 20-Cities Cost Indexes — 1913 = 100

CONSTRUCTION COST

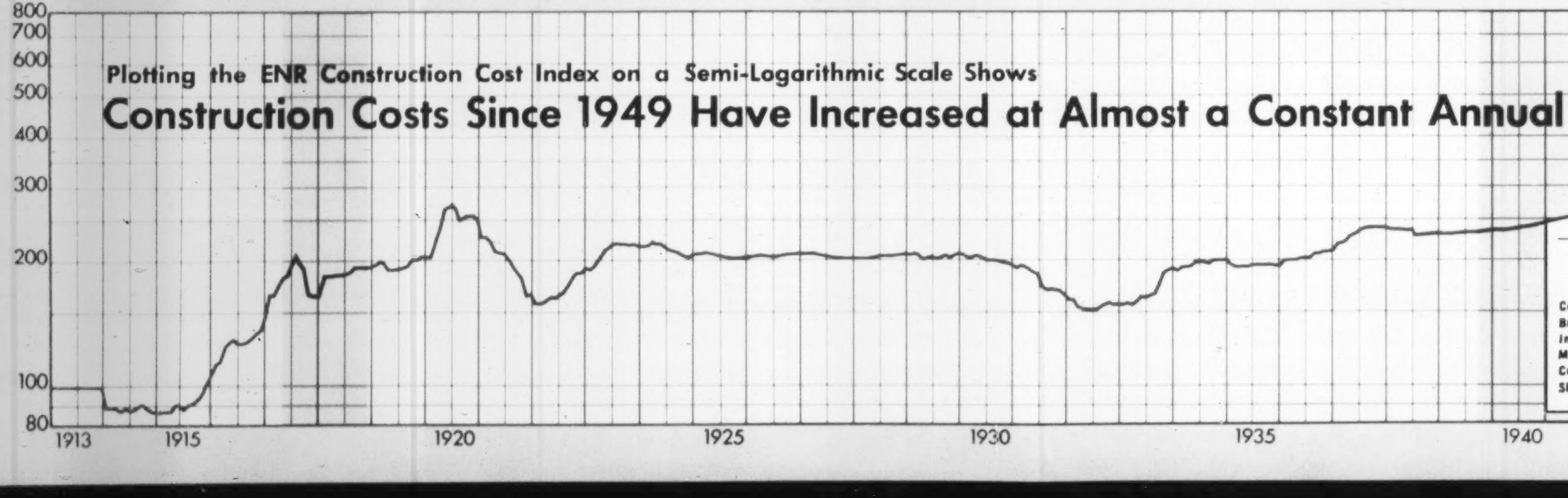
	1926	1932	1939	1940	1942	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956
Jan	207.2	162.5	234.7	238.3	267.6	302.5	316.3	387.0	441.7	477.4	484.7	532.5	548.4	587.9	614.1	643.7	676.4
Feb	206.6	161.8	234.3	238.3	269.4	303.7	319.5	393.7	442.7	475.4	484.5	538.6	549.9	587.8	614.7	645.2	680.2
Mar	207.7	157.2	234.4	238.3	269.7	304.5	323.8	395.5	443.6	474.8	488.4	539.8	551.2	588.0	614.0	645.7	680.2
Apr	207.1	153.1	234.9	238.3	271.8	306.4	334.6	399.6	443.6	474.3	491.9	540.6	554.7	590.1	615.4	647.5	683.3
May	207.3	152.8	234.7	238.9	272.3	307.4	339.7	400.0	444.9	472.1	496.6	543.5	557.7	589.6	618.7	653.3	688.4
June	204.8	152.2	235.0	241.6	274.2	309.0	348.7	406.6	455.8	473.8	506.9	543.4	562.3	593.7	621.9	656.0	692.1
July	207.8	153.4	234.9	242.2	277.7	309.0	354.7	413.8	464.8	477.5	512.7	542.9	571.3	604.6	628.3	660.1	694.8
Aug	208.3	156.8	234.9	242.2	281.6	309.1	361.4	422.9	477.1	478.3	521.4	543.5	584.3	612.6	641.7	672.2	696.3
Sept	208.3	158.0	235.0	244.1	281.6	309.3	360.2	426.4	478.4	479.8	531.0	543.6	586.7	610.9	640.2	672.7	704.9
Oct	209.8	159.2	236.9	245.0	282.4	309.3	360.9	434.6	480.2	480.5	536.2	547.1	589.0	611.6	641.5	673.9	703.9
Nov	210.8	158.2	238.2	247.2	283.6	309.3	362.5	436.9	478.3	480.0	530.0	547.7	589.2	611.8	642.4	673.2	704.1
Dec.	210.8	158.5	238.2	249.1	283.7	313.5	369.3	441.1	477.7	480.3	530.8	548.3	588.1	611.3	642.7	673.1	.....
Av	**208.0**	**157.0**	**235.5**	**242.0**	**276.3**	**307.8**	**346.0**	**413.2**	**460.7**	**477.0**	**509.6**	**542.7**	**569.4**	**600.0**	**628.0**	**659.7**	**....**

BUILDING COST

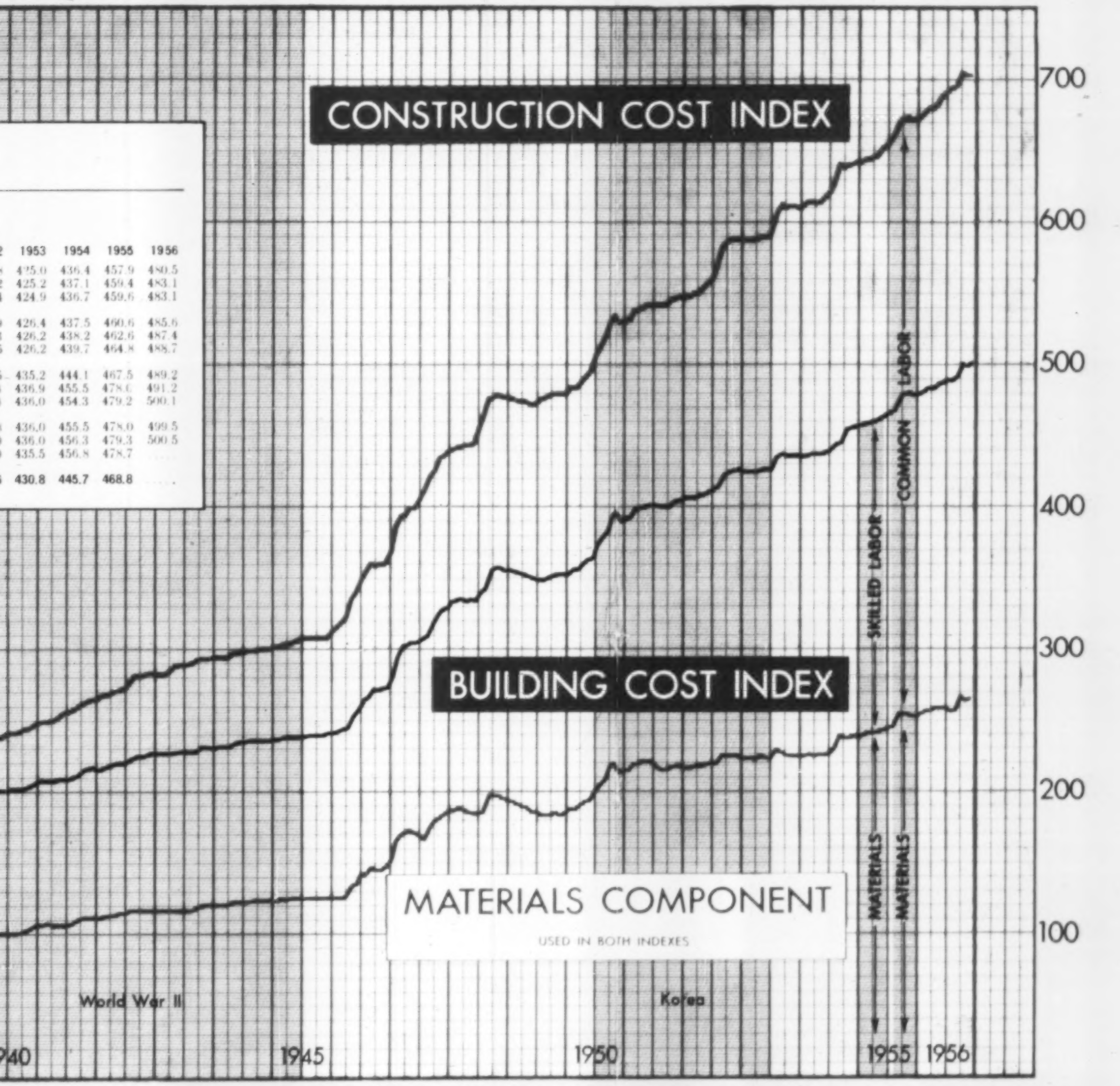
	1926	1932	1939	1940	1942	1945	1946	1947	1948	1949	1950	1951	1952	1953
Jan	182.3	150.6	196.2	201.5	217.1	236.5	242.2	294.6	333.6	355.0	356.2	393.0	405.8	425.0
Feb	183.7	147.2	196.2	201.5	218.4	237.7	243.9	301.6	335.5	352.9	356.5	398.2	406.2	425.2
Mar	184.3	145.9	196.5	201.5	218.9	237.9	245.4	303.3	334.2	352.5	360.0	399.3	407.4	424.9
Apr	184.1	135.7	196.5	201.4	219.6	238.5	254.4	305.2	334.6	351.4	362.8	400.1	407.9	426.4
May	183.6	136.4	196.6	201.2	220.1	238.5	258.1	304.6	333.9	348.9	364.3	401.1	410.3	426.2
June	181.8	137.6	196.4	201.7	221.2	239.4	265.3	307.4	339.3	349.3	373.4	400.8	412.5	426.2
July	184.3	139.5	196.8	201.7	223.5	239.6	267.3	308.9	342.4	349.5	377.7	400.3	414.5	435.2
Aug	185.1	138.4	196.5	201.7	225.4	239.9	272.3	317.8	355.5	350.9	383.1	400.2	422.4	436.9
Sept	185.1	139.6	196.6	203.1	225.5	240.1	272.4	322.6	356.7	352.0	392.2	400.3	424.4	436.0
Oct	188.0	140.0	198.5	204.2	225.9	240.4	273.0	327.3	357.1	353.0	397.4	403.4	424.8	436.0
Nov	188.0	139.5	201.2	206.2	226.6	240.6	274.0	329.2	355.9	352.9	390.2	404.5	426.0	436.0
Dec	188.0	140.0	201.2	208.2	226.6	240.8	280.0	333.1	355.6	353.2	391.4	405.8	424.9	435.5
Av	**184.9**	**140.9**	**197.4**	**202.8**	**222.4**	**239.1**	**262.4**	**313.0**	**344.5**	**351.8**	**375.5**	**400.6**	**415.6**	**430.8**

Plotting the ENR Construction Cost Index on a Semi-Logarithmic Scale Shows

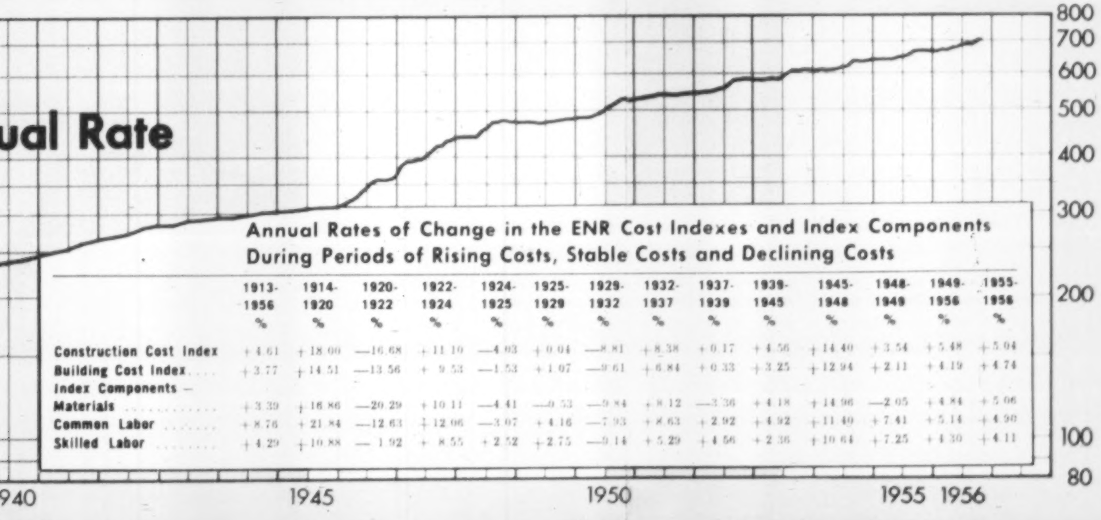
Construction Costs Since 1949 Have Increased at Almost a Constant Annual



ts in 11 Postwar Years, as Measured by Engineering News-Record



1953	1954	1955	1956
425.0	436.4	457.9	480.5
425.2	437.1	459.4	483.1
424.9	436.7	459.6	483.1
426.4	437.5	460.6	485.6
426.2	438.2	462.6	487.4
426.2	439.7	464.8	488.7
435.2	444.1	467.5	489.2
436.9	455.5	478.0	491.2
436.0	454.3	479.2	500.1
436.0	455.5	478.0	499.5
436.0	456.3	479.3	500.5
435.5	456.8	478.7	.....
430.8	**445.7**	**468.8**	.....



Annual Rates of Change in the ENR Cost Indexes and Index Components During Periods of Rising Costs, Stable Costs and Declining Costs

	1913-1956 %	1914-1920 %	1920-1922 %	1922-1924 %	1924-1925 %	1925-1929 %	1929-1932 %	1932-1937 %	1937-1939 %	1939-1945 %	1945-1948 %	1948-1949 %	1949-1956 %	1955-1956 %
Construction Cost Index	+4.61	+18.00	—16.68	+11.10	—4.03	+0.04	—8.81	+8.38	+0.17	+4.56	+14.40	+3.54	+5.48	+5.04
Building Cost Index....	+3.77	+14.51	—13.56	+ 9.53	—1.53	+1.07	—9.61	+6.84	+0.33	+3.25	+12.94	+2.11	+4.19	+4.74
Index Components —														
Materials	+3.39	+16.86	—20.29	+10.11	—4.41	—0.53	—9.84	+8.12	—3.36	+4.18	+14.96	—2.05	+4.84	+5.06
Common Labor	+8.76	+21.84	—12.63	+12.06	—3.07	+4.16	—7.93	+8.63	+2.92	+4.92	+11.40	+7.41	+5.14	+4.90
Skilled Labor	+4.29	+10.88	— 1.92	+ 8.55	+2.52	+2.75	—0.14	+5.29	+4.56	+2.36	+10.64	+7.25	+4.30	+4.11

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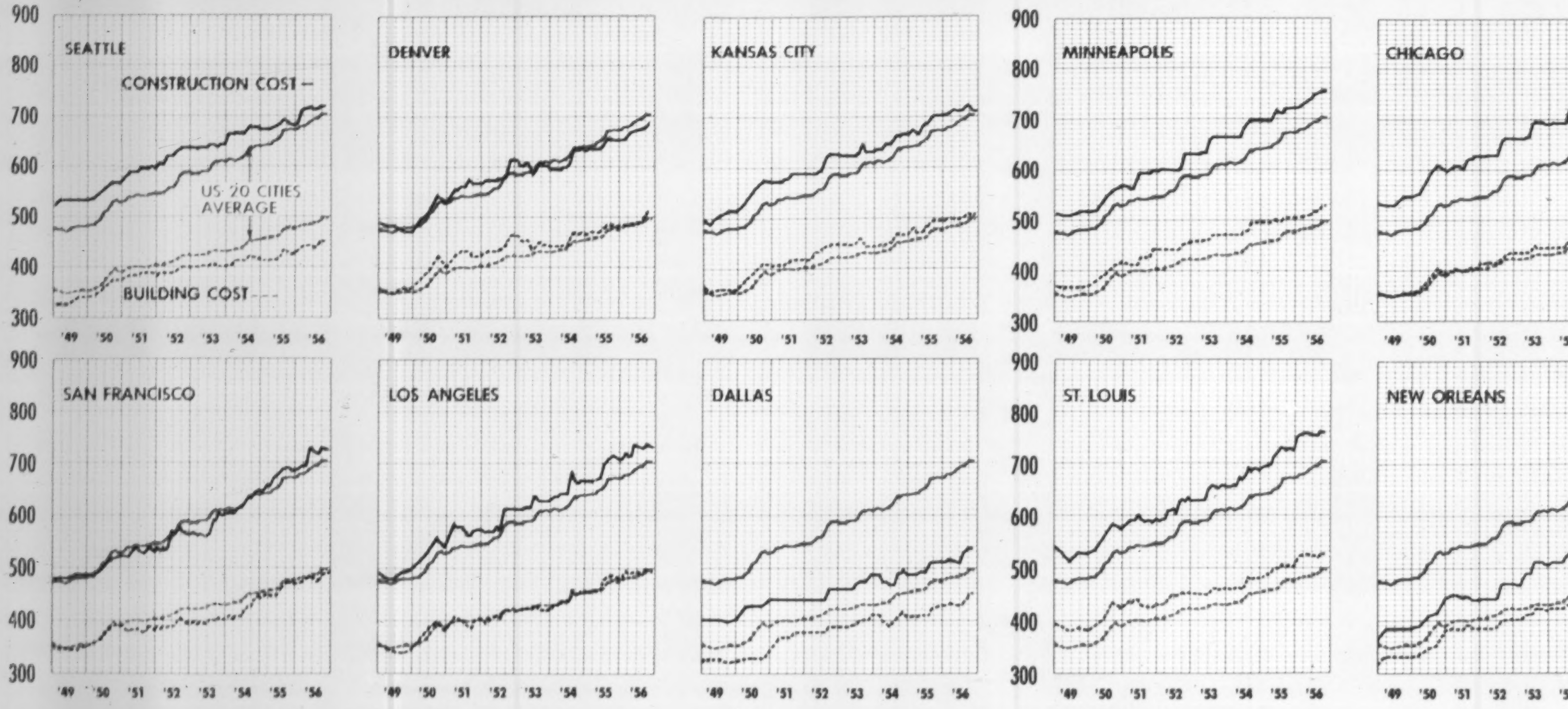
ENR Cost Indexes in 21 Cities • • • ➡



CONSTRUCTION COST INDEXES 1913=100

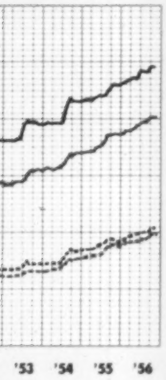
	1948		1949				1950				1951				1952				1953			
	Sep	Dec	Mar	Jun	Sep	Dec	Mar	Jun	Sep	Dec	Mar	Jun	Sep	Dec	Mar	Jun	Sep	Dec	Mar	Jun	Sep	Dec
Atlanta	325	345	345	345	345	345	354	354	394	390	395	395	395	395	395	397	402	418	424	438	460	460
Baltimore	432	432	462	425	424	424	427	462	474	474	486	488	482	513	510	511	530	526	524	525	551	553
Birmingham	378	379	379	389	389	377	381	381	388	413	415	416	416	416	417	417	450	450	450	447	469	465
Boston	513	508	507	525	525	532	536	556	570	563	576	585	590	588	590	614	630	629	626	623	626	624
Chicago	537	530	527	526	541	542	550	584	607	593	603	598	620	624	626	625	661	661	661	690	691	690
Cincinnati	505	505	495	487	496	496	502	510	558	553	553	556	543	548	547	553	612	609	609	613	633	631
Cleveland	535	523	520	514	525	530	537	578	605	587	607	606	603	626	625	685	684	682	682	706	709	708
Dallas	398	398	398	398	394	397	422	423	423	438	437	437	437	437	437	437	455	455	455	463	470	482
Denver	499	496	482	482	470	470	491	505	541	528	552	558	554	564	571	572	577	612	602	582	604	595
Detroit	511	500	501	489	514	515	521	555	583	592	592	602	601	601	621	625	636	663	663	663	687	682
Kansas City	500	500	484	501	511	511	528	551	571	570	570	575	586	586	586	588	623	623	623	623	630	630
Los Angeles	511	495	482	478	489	494	511	529	552	537	580	572	558	569	565	574	610	610	610	612	627	626
Minneapolis	512	510	504	504	512	512	516	538	555	562	557	587	587	592	593	593	628	628	628	655	661	661
New Orleans	350	354	379	379	379	379	383	402	408	438	441	439	434	435	435	437	466	466	476	486	506	502
New York	549	541	537	534	533	539	546	575	632	622	630	627	621	626	623	629	667	665	665	664	713	713
Philadelphia	470	467	462	492	517	515	518	541	550	575	575	575	582	582	601	616	636	636	636	635	666	666
Pittsburgh	470	502	502	492	492	492	497	499	532	529	531	531	551	557	557	557	607	607	607	608	640	640
St Louis	542	542	527	508	524	522	529	552	579	569	585	597	584	587	587	608	629	628	627	648	653	654
San Francisco	490	484	478	478	483	483	486	495	513	519	518	533	525	527	532	565	573	559	557	556	587	600
Seattle	512	512	530	530	530	530	534	548	564	563	586	586	593	592	606	620	635	635	635	636	636	643
Montreal	406	408	407	408	396	394	397	397	428	427	445	473	484	484	500	510	512	512	516	516	550	550

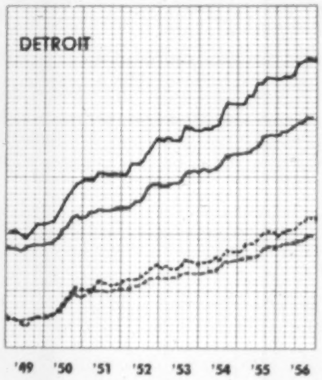
	1954												1955											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Atlanta	460	460	458	458	458	458	458	464	474	474	474	474	474	474	474	474	472	472	472	492	492	495	495	495
Baltimore	553	552	549	549	551	548	548	572	573	573	578	578	575	575	574	574	575	575	581	594	595	595	597	592
Birmingham	465	465	465	465	465	465	466	486	488	503	503	507	511	511	511	511	511	511	511	519	519	519	524	534
Boston	623	626	627	628	659	659	663	671	669	669	671	671	674	676	675	691	694	696	696	709	709	708	708	709
Chicago	691	691	692	692	692	691	726	738	734	733	733	734	736	736	736	738	742	741	742	751	752	763	761	762
Cincinnati	630	630	630	630	630	630	650	644	641	641	641	642	642	642	645	645	647	664	664	673	673	673	671	671
Cleveland	709	709	712	711	711	731	740	738	738	739	750	751	752	754	759	759	762	762	777	785	785	785	785	785
Dallas	482	482	470	470	465	465	465	487	487	494	484	484	484	484	484	488	488	488	498	507	507	507	510	510
Denver	595	595	595	595	597	597	609	638	633	633	635	632	632	635	635	635	635	637	647	656	656	656	653	653
Detroit	685	685	685	689	690	700	721	732	729	729	729	729	730	743	743	743	763	763	767	776	776	776	774	772
Kansas City	631	633	635	645	645	645	653	667	661	663	663	663	667	676	665	666	681	686	686	695	703	703	703	703
Los Angeles	629	634	634	640	640	640	641	684	665	662	667	667	667	667	667	668	669	672	696	705	705	713	710	708
Minneapolis	661	661	661	661	661	681	682	697	697	697	697	697	697	697	697	697	717	711	711	720	720	720	726	720
New Orleans	506	506	506	506	506	516	520	528	528	525	525	523	524	522	522	523	534	535	536	545	545	546	545	545
New York	734	733	732	732	732	732	734	742	742	742	742	745	748	747	747	747	747	750	750	794	794	794	794	791
Philadelphia	666	666	666	666	681	681	681	689	691	691	691	691	696	696	696	696	696	711	712	721	721	721	721	721
Pittsburgh	643	645	645	645	645	645	645	654	666	654	654	654	654	654	657	667	667	669	671	690	690	695	695	695
St Louis	654	654	655	656	671	669	673	690	684	687	688	687	689	692	693	695	716	720	723	731	728	730	729	727
San Francisco	601	605	602	605	616	617	624	632	631	643	646	649	647	651	658	655	675	676	680	688	690	690	684	684
Seattle	664	664	664	665	665	665	665	677	682	679	679	676	676	676	676	678	680	681	684	693	693	688	685	685
Montreal	550	550	516	516	513	513	513	528	526	515	542	542	539	528	528	528	536	525	525	529	532	540	550	550

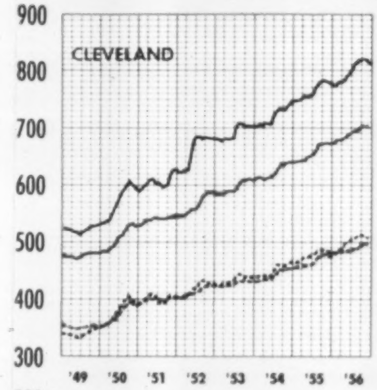
BUILDING COST INDEXES 1913=100

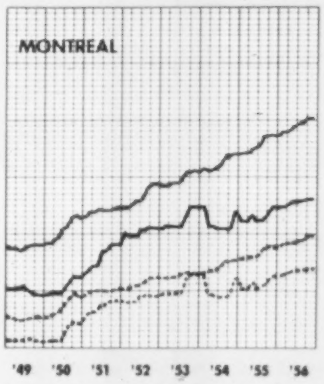
	1948		1949				1950				1951				1952				1953			
	Sep	Dec	Mar	Jun	Sep	Dec	Mar	Jun	Sep	Dec	Mar	Jun	Sep	Dec	Mar	Jun	Sep	Dec	Mar	Jun	Sep	Dec
Atlanta	302	308	308	308	309	313	316	316	339	339	339	339	339	351	351	353	364	371	376	376	394	394
Baltimore	375	387	387	349	354	351	354	375	391	387	398	403	398	413	410	414	420	416	414	415	427	428
Birmingham	320	321	326	329	330	319	321	321	328	345	351	351	351	383	355	358	372	372	372	372	390	386
Boston	363	357	357	362	361	372	375	379	396	392	404	407	412	410	411	422	426	425	422	419	433	433
Chicago	360	353	350	349	352	353	361	381	404	391	401	395	408	413	415	416	432	433	433	443	443	443
Cincinnati	374	374	358	356	362	362	360	368	405	392	411	398	395	401	400	406	423	420	420	424	435	434
Cleveland	352	339	337	332	342	349	356	379	406	388	402	402	399	403	403	419	431	428	430	435	439	438
Dallas	322	322	322	322	316	318	322	323	323	338	362	362	371	371	371	371	382	382	382	387	397	405
Denver	369	365	351	251	359	359	378	395	423	400	426	432	423	425	431	433	452	462	452	434	449	441
Detroit	358	347	348	336	351	351	357	376	404	400	402	411	410	416	419	424	439	438	438	441	450	446
Kansas City	366	367	352	357	357	357	374	390	410	406	406	411	417	417	431	434	446	448	446	452	442	442
Los Angeles	368	356	343	339	336	340	360	380	392	377	403	395	381	398	394	407	415	415	420	421	420	419
Minneapolis	370	368	361	361	361	363	377	389	406	413	408	421	423	438	438	438	450	454	454	459	468	468
New Orleans	302	310	325	325	325	325	329	340	346	376	379	377	379	379	379	381	397	397	398	407	419	416
New York	403	395	400	398	397	402	410	439	464	459	466	463	457	462	460	465	487	484	484	483	505	507
Philadelphia	394	391	386	394	394	392	397	415	430	449	449	449	456	461	462	472	477	480	480	479	494	494
Pittsburgh	376	384	384	375	375	377	382	387	401	397	403	400	405	416	416	416	427	439	439	440	460	460
St. Louis	385	391	386	375	379	377	384	396	431	421	432	436	422	427	429	444	448	447	446	446	457	455
San Francisco	350	347	341	341	341	345	352	361	383	389	375	380	377	379	383	386	401	390	391	390	397	400
Seattle	328	328	328	328	340	341	344	358	374	374	384	384	389	383	389	389	400	400	400	401	402	402
Montreal	314	316	315	316	[illegible]	314	317	317	346	345	363	378	385	385	383	393	395	395	399	399	430	430

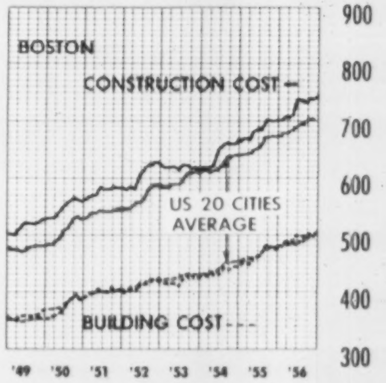
	1954												1955											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Atlanta	394	394	392	392	392	392	392	398	400	400	400	400	400	400	400	400	399	399	401	417	417	419	419	419
Baltimore	428	428	424	424	426	423	423	447	448	448	453	455	452	452	450	451	452	452	457	470	472	472	477	472
Birmingham	386	386	386	386	386	386	387	406	409	416	416	420	423	423	423	423	423	423	423	432	434	442	442	442
Boston	435	435	436	437	438	438	442	450	448	451	453	453	457	459	458	458	468	471	474	488	488	486	486	487
Chicago	444	444	445	445	445	449	458	470	467	466	466	468	469	469	469	471	475	477	478	487	488	487	485	486
Cincinnati	433	433	435	435	434	434	437	444	444	444	444	445	447	447	450	450	452	456	458	467	467	467	465	466
Cleveland	439	439	442	441	441	451	460	458	458	459	464	464	465	467	472	472	475	477	480	489	489	489	489	489
Dallas	405	405	393	393	387	390	390	402	405	412	402	402	402	402	402	406	406	406	406	419	422	422	426	426
Denver	441	441	441	441	443	443	455	470	468	468	469	467	467	470	470	470	470	474	475	485	485	486	483	483
Detroit	448	448	449	453	454	452	458	470	467	466	466	466	468	481	481	481	481	490	494	503	503	503	501	498
Kansas City	442	445	446	446	450	450	458	468	466	466	466	466	471	479	468	469	469	479	479	488	496	496	496	496
Los Angeles	422	428	428	433	433	433	434	457	448	446	452	452	452	452	453	454	454	457	471	486	483	484	481	479
Minneapolis	468	468	468	468	468	473	476	491	491	492	492	492	492	492	492	492	499	493	493	502	502	502	502	502
New Orleans	419	419	419	419	419	422	427	435	435	431	434	432	433	431	431	432	439	439	441	450	449	450	449	449
New York	512	511	509	509	509	516	518	526	526	526	526	528	532	531	531	531	531	533	533	548	548	548	548	545
Philadelphia	494	494	494	494	503	503	503	511	516	516	516	516	521	521	521	521	521	523	524	533	533	535	535	535
Pittsburgh	460	463	463	463	463	463	463	475	475	475	475	475	475	475	478	488	488	489	487	498	498	506	506	506
St. Louis	455	455	455	456	458	457	460	480	473	476	477	477	478	481	483	484	490	495	497	506	503	505	504	502
San Francisco	401	405	402	406	406	407	417	425	423	436	440	443	441	444	447	444	444	445	454	463	469	469	463	463
Seattle	405	405	412	413	413	413	413	425	419	417	417	414	414	414	414	415	417	418	424	436	436	431	428	428
Montreal	430	430	396	396	393	393	393	393	391	395	422	422	419	408	408	408	416	405	405	409	412	420	427	427

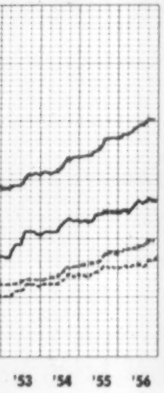


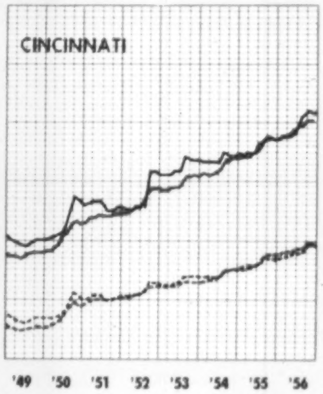


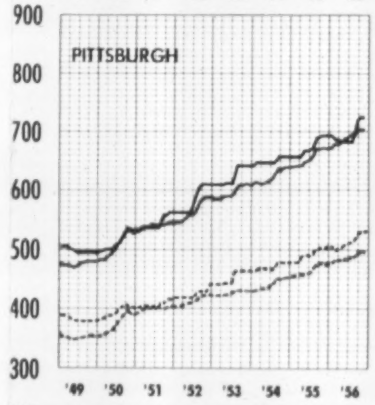


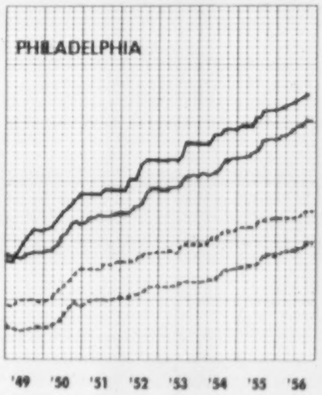


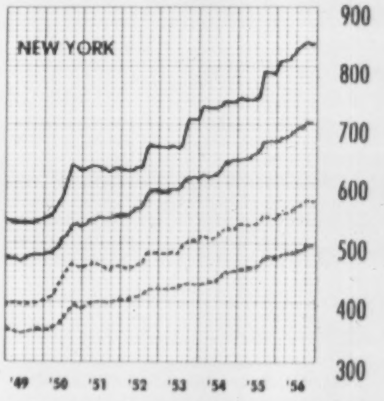


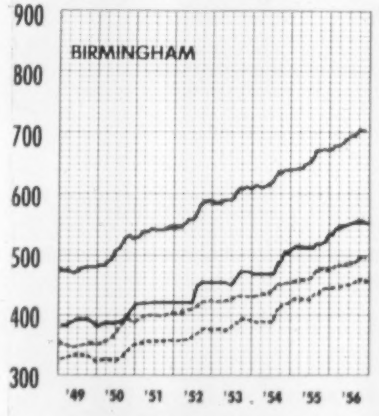


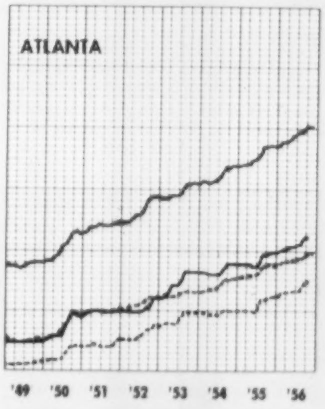


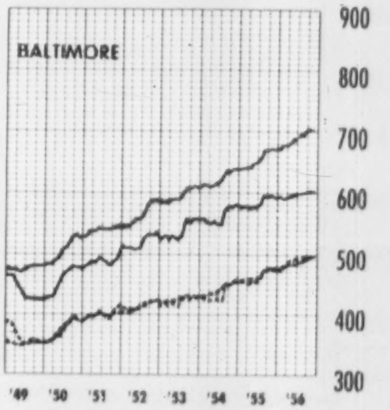












Dec	1956 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
495	498	502	502	502	502	502	502	512	522	522	522	Atlanta
592	593	591	591	595	595	595	595	595	601	602	602	Baltimore
534	536	546	546	549	549	549	549	549	557	557	553	Birmingham
709	709	714	712	714	745	744	743	741	746	744	747	Boston
762	765	769	769	774	773	788	786	784	792	792	792	Chicago
671	674	674	674	677	680	680	707	707	717	715	715	Cincinnati
785	778	783	785	793	793	809	819	819	826	824	819	Cleveland
510	510	512	512	511	511	509	524	524	534	534	534	Dallas
653	654	655	655	670	670	670	670	670	680	680	696	Denver
772	775	777	778	778	780	800	800	800	810	808	808	Detroit
703	704	707	707	714	711	711	712	712	722	716	716	Kansas City
708	708	719	714	716	736	733	730	729	736	734	731	Los Angeles
720	721	721	721	721	741	747	747	747	757	757	757	Minneapolis
545	546	549	547	549	549	564	560	560	567	565	564	New Orleans
791	813	813	816	819	819	819	838	838	847	845	845	New York
721	722	722	722	722	722	737	737	737	747	747	747	Philadelphia
695	696	688	688	688	688	688	685	717	727	727	727	Pittsburgh
727	751	757	757	759	759	756	754	753	761	761	759	St Louis
684	686	691	693	697	727	726	718	716	727	724	723	San Francisco
685	689	715	715	719	720	720	716	716	724	724	724	Seattle
550	550	550	552	552	558	560	560	560	560	563	563	Montreal

Dec	1956 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
419	422	424	424	424	424	424	424	431	441	441	441	Atlanta
472	473	472	472	483	491	491	491	491	497	498	498	Baltimore
442	443	443	443	447	447	447	448	448	456	458	455	Birmingham
487	488	493	490	492	504	503	502	503	508	506	509	Boston
486	489	493	493	498	498	501	502	500	507	507	507	Chicago
466	469	469	469	473	475	475	479	483	493	491	491	Cincinnati
489	482	487	489	497	497	508	508	508	515	512	508	Cleveland
426	426	428	428	426	426	424	431	434	446	446	449	Dallas
483	484	486	487	488	488	488	491	493	503	503	519	Denver
498	502	503	505	505	507	514	518	518	528	527	527	Detroit
496	496	499	499	499	498	498	499	499	509	503	505	Kansas City
479	479	490	485	488	490	491	488	487	497	496	493	Los Angeles
502	503	503	503	503	510	515	516	516	526	526	526	Minneapolis
449	451	453	451	453	453	457	452	455	462	460	464	New Orleans
545	551	551	553	556	556	556	565	565	573	571	571	New York
535	536	536	536	536	536	538	538	538	548	549	549	Philadelphia
506	507	500	500	500	500	500	500	519	529	533	533	Pittsburgh
502	513	523	523	526	526	522	521	520	527	527	525	St. Louis
463	465	470	471	476	479	478	470	472	483	484	488	San Francisco
428	432	439	439	443	444	444	440	444	452	452	452	Seattle
427	427	427	429	429	435	437	437	437	437	440	440	Montreal

ENR Cost Indexes in 21 cities

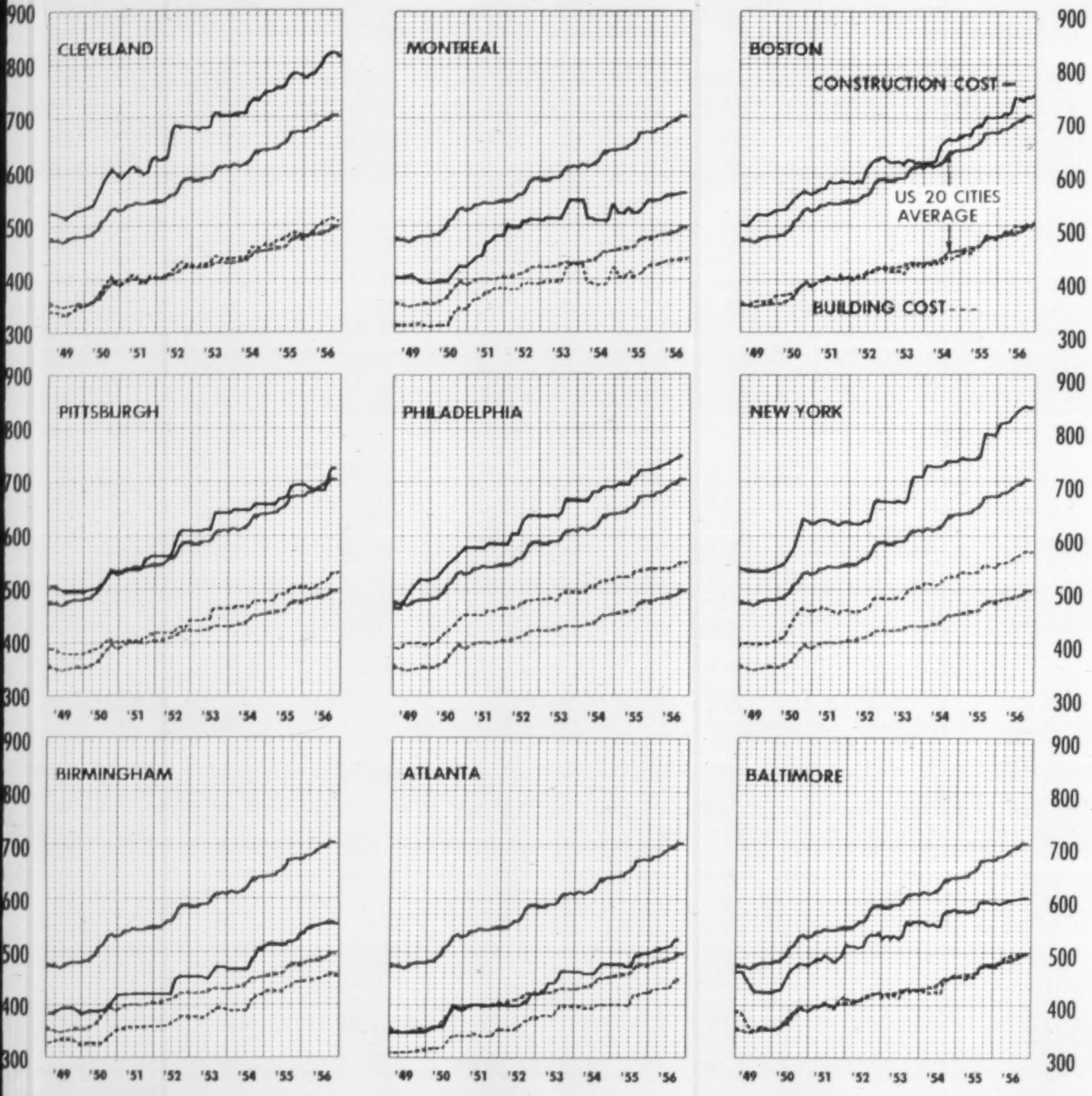
Components of Construction Cost Index and weighting in U.S. cities are: 25 cwt structural steel shapes, base mill price; 6 bbl portland cement, bulk, 1.088 M ft bm 2x4, S4S lumber, 200 hr common labor, at local prices.

In Canada, warehouse price has to be used, so 15 cwt is weighting for steel. Price of Canadian steel is used prior to Oct. 1949 — the average of Canadian and U.S. steel prices is used after devaluation of Canadian dollar in Oct. 1949. Cement weighting is 10 bbl. Other elements are same as for USA cities.

Components of Building Cost Index and weighting are same but 68.38 hr of skilled labor is used instead of common labor.

These regional indexes were first reported quarterly from September 1948 through March 1951, then monthly beginning April 1951. Each of the 21 cities indexes together with their components, has been reported weekly in Construction Daily starting July 1954.

These ENR Cost Indexes measure movements in the cost to contractors and engineers of construction materials and labor. They do not adjust for productivity. Where major differences between cities occur, the main reason is found usually in wage differentials. Lower wages are often accompanied by lower productivity, hence allowances for job productivity should be made in estimating end-product-price, or construction selling-price trends based on the cost trends shown here.



ENR Cost Indexes in 21 cities

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ENR'S 1955-56 ANNUAL REPORT ON . . .

Construction Costs

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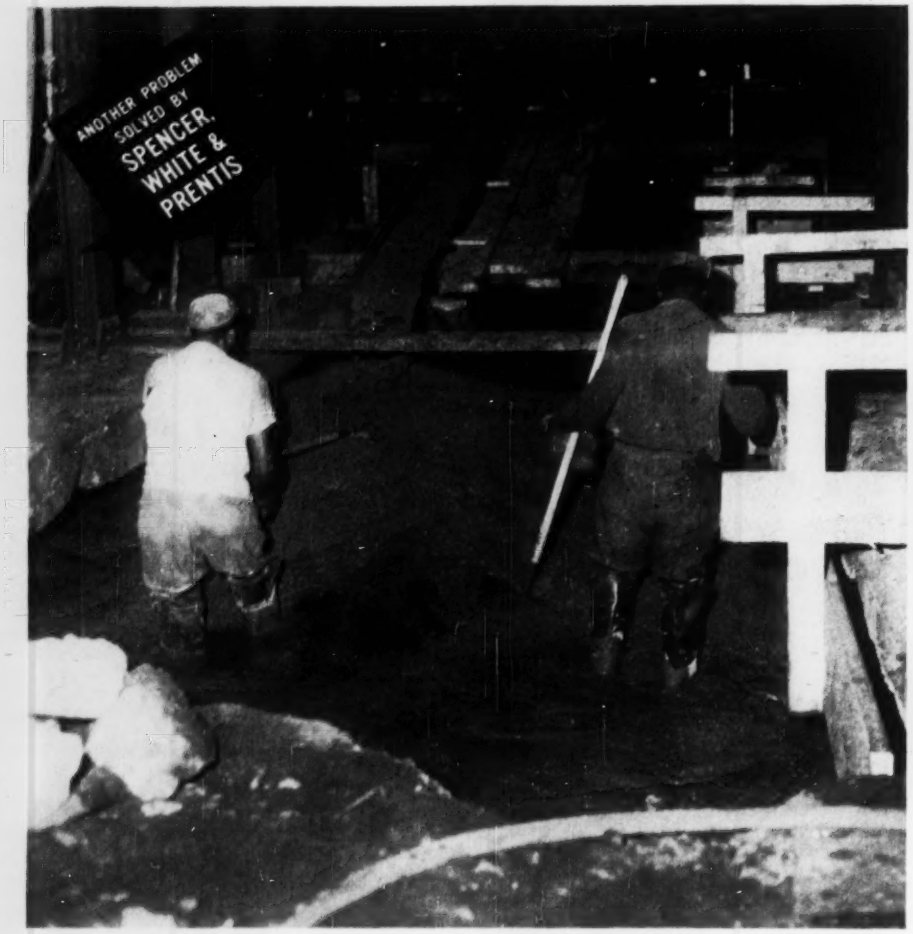
CONSTRUCTION COSTS continued their relentless rise in 1956 in response to a record demand for new construction. Materials prices, wage rates and contractors' bid prices reflected the pressures of rapidly increasing demand.

As the boom caused a cost rise, the cost threatened the boom. This is because the federal government adopted monetary policies to tighten credit to forestall inflation. A housing slump and tapering off in some commercial construction and local public works followed. As a result the boom lost some of its momentum in the second half of the year. Shortages evaporated for some materials used in large volume by housing and commercial building, but not for steel. Some price declines showed up, notably in lumber and insulation materials.

But the strong spots far outweighed the weak spots in the 1956 construction picture. Booming industrial building, the strong start on new highways and other heavy construction kept the pressure on materials producers and equipment makers. Prices responded quickly.

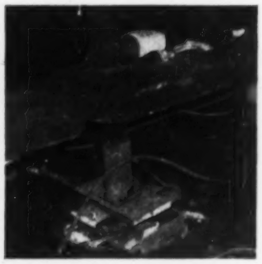
Fast-moving trends in construction costs and bid prices, such as prevail in 1956, warrant the close and constant attention of engineers and contractors.

The pages that follow are intended to help you review, understand and sharpen your knowledge of these cost and price movements. Regular issues of ENR will up-date you on these throughout the coming year.



Project: Restoring washed-out subway roadbed for New York City Transit authority

Photo shows gaping hole in south-bound roadbed



Hydraulic jacks installed to support columns

Concrete is chuted in through an opening cut in tunnel roof

SUBWAY WASHOUT: HERE'S HOW FAST IT'S REPAIRED

When New York City's Old Wanamaker building went up in flames, tons of water required to quench the fire reached the East Side subway—almost directly below—and washed out a roadbed section 100x130 ft., up to 8 ft. in depth. City officials feared repairs might take weeks when the Transit Authority sent its rush-call to Spencer, White & Prentis, who had handled many of their previous jobs. Actually, the roadbed was perfectly restored in 84 hours by experienced engineers and crews, thus enabling the Transit Authority to replace tracks and resume subway service in minimum time. Large photo shows cavity being filled with 300 cu. yds. of concrete. Other job highlights are pictured in the smaller photos to the right.

CATALOGUE ON REQUEST

FOUNDATIONS
PILING
UNDERPINNING
SHORING
COFFERDAMS
SPECIAL SERVICES

Spencer, White & Prentis INC.

10 EAST 40th STREET, NEW YORK 16, N. Y.

DETROIT: 2033 PARK AVE. • CHICAGO: 228 NORTH LaSALLE ST. • WASHINGTON, D. C.: TOWER BLDG.
OF CANADA: 700 BAY ST., TORONTO • 2052 ST. CATHERINE ST. WEST, MONTREAL

The '57 Outlook for Construction Costs

Construction faces continuing cost increases next year. You can count on price advances for construction steel, portland cement, wage rates and construction machinery and equipment. In fact, the only major construction material that is a candidate for a price dip is lumber. A continuing sag in demand from the homebuilding industry will probably bring some further softening in both lumber and plywood prices.

Increases for cement and steel are a foregone conclusion. Some cement companies already have announced price increases at their mills to become effective on the first of the year. Steelworkers have a wage increase for 1957 written into their 1956 agreement, which will mean another hike in steel prices about mid-'57, if not actually before then.

Construction wage raises for 1957 also are already written into many of the longer-term, two-year and three-year contracts now in effect. Analysis of a large sample of these contracts places the average deferred wage increase for 1957 at nearly 12 cents per hour. This compares with the 1956 actual 20-cities average wage increases of 13 to 15 cents per hour for the three key skilled trades (bricklayers, carpenters and structural ironworkers) and nine cents per hour for common labor.

• **On the combination of materials and wages, ENR forecasts** for its Construction Cost Index a rise of 24 points, or 3.4% to a new high of 728 by December, 1957 and for the Building Cost Index, a corresponding rise of 13 points, or 2.6% to 513, also a new high. Both index values are on a 1913=100 base.

Back of these forecast increases are these assumptions, that:

- Structural steel (3-mill average) will go up to 25 cents to $5.25/cwt.
- Portland cement (20-cities average) will rise 15 cents to $3.88 per bbl., in bulk, fob city.
- Lumber, average fir and pine 2x4's (20-cities average) will dip $2 to $108 per Mfbm, fob city.
- Skilled labor rates (20-cities average of bricklayers, carpenters and structural ironworkers) will increase by 11 cents per hour to $3.52, including fringes.
- Common labor (20-cities average on building and heavy construction) will go up nine cents to $2.28 per hour, including fringe benefits. This 3.4% increase forecast for the ENR Construction Cost Index is less than the actual 4.5% rise in '56, which, in turn was below the 5.5% increase in '55. Similarly, the Building Cost Index is expected to rise at a slower pace in '57 than in either of the past two years.

• **Contractor selling prices** moved sharply higher in '56. Increases generally were greater than corresponding increases in the ENR cost indexes, which measure the cost trend to contractors of materials and labor but do not adjust for "productivity" or managerial skill.

Because most materials shortages have practically disappeared (except for steel) and because bids this year have overtaken their earlier lag behind rising costs, bid price rises in '57 should average out more in line with the rises in ENR Cost Indexes. This year they went up at a faster clip.

• **Equipment prices** advanced swiftly in 1956. By October, the average price of excavating and earthmoving machinery had increased nearly 8% over a year ago, as measured by BLS wholesale price index. Following the mill price increase for steel last August, several equipment makers announced increases ranging from 4% to 10% for their lines.

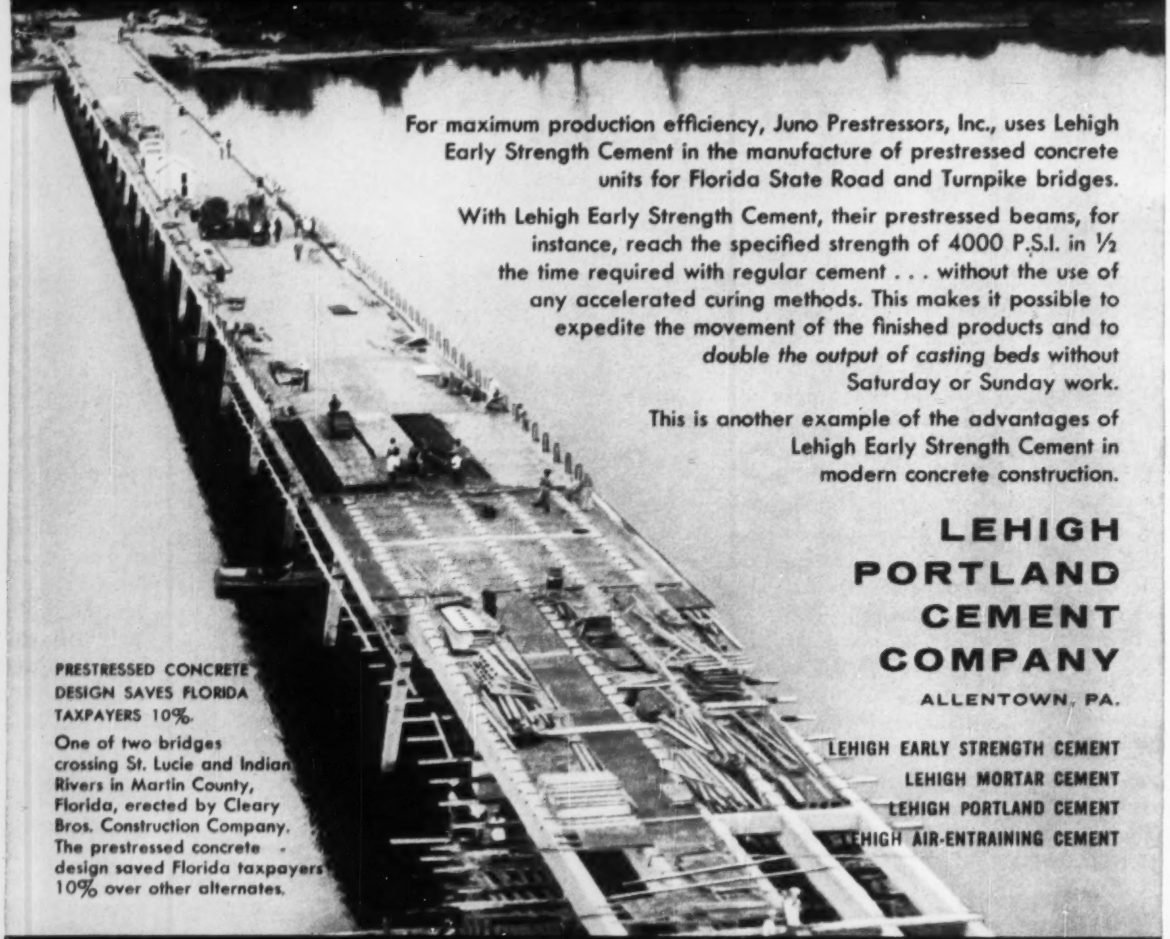
A further advance in equipment prices is expected next year for two big reasons: Another increase in steel prices is coming; and a new record for equipment sales will mean a good climate for increase. ENR estimates that price increases next year will average 3% to 4% for construction machinery.

• **Rental rates** continued to rise during 1956 for many types of construction machinery and equipment. Increase in retails tended to be substantially more than the rise in manufacturers' prices for new equipment.

• **Rising interest rates** pushed financing costs during '56 to the highest level since the 1930s. Contractors paid more for working capital borrowed from banks than in any year since 1933. The average interest charge on loans by banks in 19 leading cities rose 0.42 percentage points during the first nine months, according to Federal Reserve Board figures.

LEHIGH EARLY STRENGTH CEMENT

speeds production of prestressed bridge units



For maximum production efficiency, Juno Prestressors, Inc., uses Lehigh Early Strength Cement in the manufacture of prestressed concrete units for Florida State Road and Turnpike bridges.

With Lehigh Early Strength Cement, their prestressed beams, for instance, reach the specified strength of 4000 P.S.I. in ½ the time required with regular cement . . . without the use of any accelerated curing methods. This makes it possible to expedite the movement of the finished products and to *double the output of casting beds* without Saturday or Sunday work.

This is another example of the advantages of Lehigh Early Strength Cement in modern concrete construction.

LEHIGH PORTLAND CEMENT COMPANY

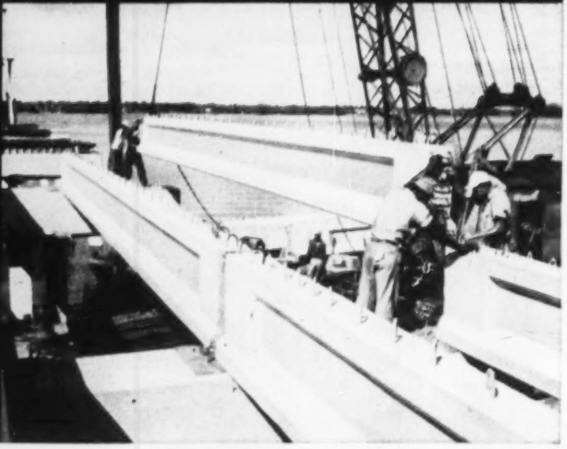
ALLENTOWN, PA.

LEHIGH EARLY STRENGTH CEMENT
LEHIGH MORTAR CEMENT
LEHIGH PORTLAND CEMENT
LEHIGH AIR-ENTRAINING CEMENT

PRESTRESSED CONCRETE DESIGN SAVES FLORIDA TAXPAYERS 10%.

One of two bridges crossing St. Lucie and Indian Rivers in Martin County, Florida, erected by Cleary Bros. Construction Company. The prestressed concrete design saved Florida taxpayers 10% over other alternates.

Casting yard of Juno Prestressors, Inc. a subsidiary of Cleary Brothers Construction Company, West Palm Beach, Florida. Ready mixed concrete supplied by Rinker-Riviera Company, Riviera Beach, Florida.



Pretensioned beam being placed. Beams are 47' 3" long, 3' deep. They measure 12" at the top, 18" at the bottom. Web is 6" thick. Piling is 20"x 20". Both beams and piles were made with Lehigh Early Strength Cement.

Composition, History and Use, ENR Cost Index

ENR's Construction Cost Index was established in 1921 to trace the rapid changes in prices, which roller-coasted up and down following World War I. This index was carried back to 1913 by months and to 1903 by years.

The Building Cost Index was established in 1938 when common labor rates began to move up faster than skilled rates.

Both indexes reprice hypothetical blocks of construction made up of the big three materials, steel, lumber, cement and the big four construction trades, common labor, carpenters, bricklayers and ironworkers. These are weighted like this:

Cost Index Weighting

Components		Construction	Building
Steel	cwt	25	25
Lumber, 2x4's	mbf	1.088	1.088
Cement	bbl	6	6
Common labor	hr	200	...
Skilled labor	hr	...	62.38

- Steel is priced at three mills—Pittsburgh, Gary, Birmingham.

- Cement is priced in bulk, fob city, cash discount not deducted, 20 cities.

- Lumber is 2x4's, carlots, fob city except fob mill in Atlanta, Birmingham, New Orleans, Seattle; delivered in Dallas, Detroit, Pittsburgh, St. Louis; lcl at yard in Los Angeles; lcl delivered in Minneapolis; and delivered in trucklots in New York.

- Common labor is priced by a straight average of rates on building and on heavy construction.

- Skilled labor is priced by a straight average of carpenter, bricklayer and structural ironworker rates.

Values for both indexes in each of the 20 US cities for which ENR reports prices and 1 city in Canada are available from September 1948 to date, quarterly until 1951 then monthly. A second Canadian city, Toronto, was added in April, 1955.

Construction Dollar Volume Compared With Volume Index

Year	Engineering construction volume million $	1913 $ volume equals 100	ENR volume index* 1913 = 100
1925	$2,559	426	218
1926	2,854	475	246
1927	3,254	541	279
1928	3,579	595	305
1929	3,950	657	334
1930	3,173	528	273
1931	2,432	404	226
1932	1,219	203	134
1933	1,068	178	110
1934	1,361	226	120
1935	1,590	264	143
1936	2,387	397	204
1937	2,438	405	190
1938	2,792	464	213
1939	3,003	499	228
1940	3,987	664	299
1941	5,869	976	430
1942	8,006	1,331	546
1943	3,062	509	204
1944	1,730	288	110
1945	2,289	381	146
1946	5,176	844	298
1947	5,659	941	271
1948	7,219	1,200	304
1949	8,157	1,358	345
1950	13,342	2,220	549
1951	13,605	2,264	522
1952	15,689	2,610	577
1953	15,171	2,524	506
1954	14,412	2,396	481
1955	18,722	3,113	600
1956 (10 months)	18,386	3,686	688

* corrected for cost changes by dividing dollar volume by ENR construction and building cost indexes and reducing to 1913 = 100

ENR Cost Indexes For Other Base Years

Engineering News-Record Cost Indexes may be converted to any base year desired:

Index Value	Construction Cost Base Years				Building Cost Base Years			
	'26 =	'39 =	'40 =	'49 =	'26 =	'39 =	'40 =	'49 =
Year	100	100	100	100	100	100	100	100
1926	100	88	86	44	100	94	91	53
1928	99	...	...	...	102	...	...	...
1929	100	...	...	...	103	...	...	...
1930	98	...	...	...	100	...	...	...
1931	87	...	...	...	91	...	...	...
1932	75	...	...	...	76	...	...	...
1933	83		...	...	80			...
1939	113	100		...	107	100		...
1940	116	103	100	...	110	103	100	...
1941	124	109	107	...	114	107	104	...
1942	133	117	114		120	113	110	
1945	148	131	127		129	121	118	
1946	166	147	143		142	133	129	
1947	199	175	171		169	159	154	
1948	222	196	190		186	175	170	
1949	229	203	197	100	190	178	173	100
1950	245	216	211	107	202	190	185	107
1951	261	230	224	114	217	203	198	114
1952	274	242	235	119	225	211	205	118
1953	288	255	248	126	233	218	212	122
1954	302	267	260	132	241	226	220	127
1955	317	280	273	138	254	237	231	133
	a	b	c	d	a	b	c	d

For conversion factors a, b, c, d, see table below.

Conversions to other base years are made by simple ratios:

$$I_{nb} = \frac{I_{ob}}{I_{oby}} \times 100$$

where I_{nb} is index on new base
I_{ob} is index value on old base
I_{oby} is old base index value for new base year

How to Convert Indexes To Other Base Years

To change base years for Engineering News-Record Construction and Building Cost Indexes, divide by following conversion factors:

To convert from base . . . 1913 = 100 to base below . . .		Divide 1913 = 100 values for Construction Cost Index by	Divide 1913 = 100 values for Building Cost Index by
1949 = 100	d	4.7702	3.5179
1947-49 = 100		4.5033	3.3642
1940 = 100	c	2.4196	2.0281
1939 = 100	b	2.3551	1.9744
1926 = 100	a	2.0803	1.8499
1925-29 = 100		2.0695	1.8648
1926-29 = 100		2.0702	1.8747
1929 = 100		0.0702	1.9086
1910-14 = 100		0.9380	0.9477
1924 = 100		2.1536	1.8578
1923-25 = 100		2.1204	1.8481
1914 = 100		0.8856	0.9191
1911 = 100		0.9343	0.9414

Applies to 20-cities index, not to individual cities

a,b,c,d, conversion factors used to get the accompanying table showing ENR cost index values for four different base years, 1926, 1939, 1940, 1949.

Both indexes, the 20-city averages and for each of the cities separately, are now computed weekly and published in Construction Daily. The weekly index dated Thursday closest to the first of the month is the official monthly index.

These indexes are widely used to update cost estimates, to establish reproduction new values, to interpolate special purpose but less frequent and timely indexes, to serve as the base for constructing a special purpose index, to deflate construction dollar volume statistics and measure volume in "constant" dollars.

Dept. of Commerce Composite Cost Index

This is a composite of special purpose and general construction cost and price indexes weighted monthly by estimated dollar volume of construction put in place.

On some types of work, two indexes are used, one special purposed for deflating, the other, available monthly, for interpolating for the months between the less frequent values of special purpose indexes. (See footnote to table for index, or indexes, used for each type of construction.)

Current dollar volume estimates for each type of construction are deflated by indexes indicated and the sum of all deflated segments is computed. This sum is divided into the estimated total of all types of construction in current dollars to compute the values in the table for the Department of Commerce Composite Construction Cost Index.

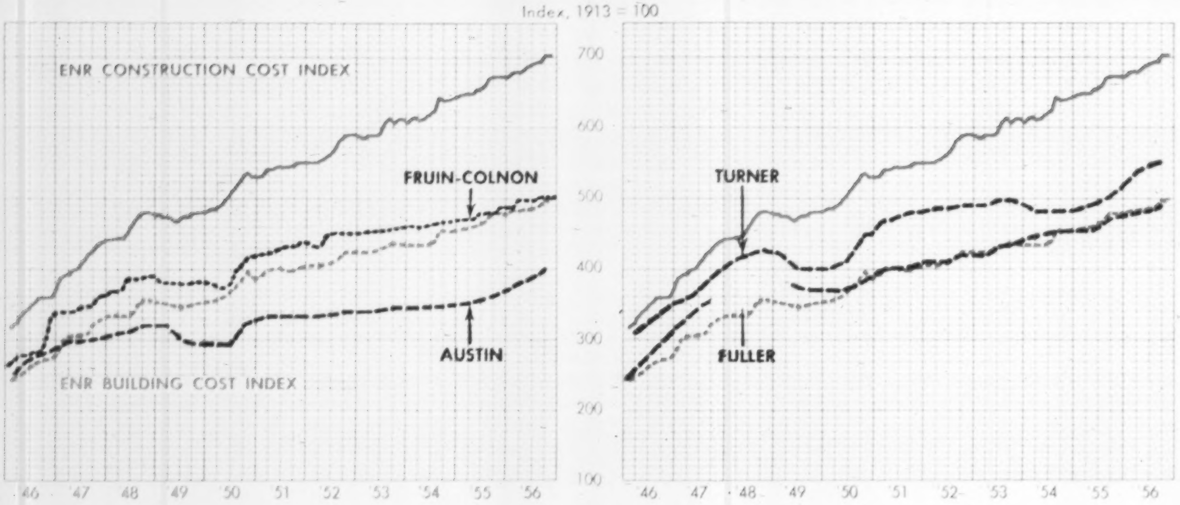
Composite Cost Index 1947–49 = 100

Building Materials & Construction Division, U. S. Department of Commerce

By years		By months	1949	1951	1952	1953	1954	1955	1956
'34	48.2	Yr	103.0	115.4	119.1	121.8	121.6	124.6	...
'35	46.6								
'36	48.2	J	105.7	113.2	118.4	120.8	121.9	122.6	127.1
'37	51.4	F	105.6	114.2	118.4	120.7	121.0	122.7	127.9
'38	51.7	M	104.8	114.4	118.4	120.8	121.3	123.2	128.6
'39	49.0	A	104.2	114.9	118.7	120.8	121.2	123.5*	129.4
'40	50.1	M	103.2	115.4	119.6	121.1	121.4	123.8*	130.3
'41	54.0	J	103.1	115.8	120.8	122.1	122.0	124.6*	130.8
'42	61.0								
'43	64.7	J	101.9	116.1	122.0	123.1	122.0	125.8*	131.3
		A	101.4	116.3	122.6	123.1	121.9	126.2	132.1
'44	64.4	S	101.6	117.0	123.0	123.1	122.1	126.5	132.2
'45	66.7								
'46	76.5	O	101.8	117.5	122.6	122.8	122.6	126.7	...
'47	93.3	N	101.8	117.6	122.5	122.9	122.4	126.8	...
'48	104.0	D	101.6	117.5	122.5	123.0	122.5	127.0	...

* Revised

By classes of construction the indexes used are: residential, Boeckh; industrial building, Turner Boeckh; warehouses, office and loft buildings, Fuller Boeckh; other private and public buildings, American Appraisal; farm dwellings, Bu of Agriculture Economics Boeckh; farm service buildings, BAE Amer Appr; railroad, ICCRR ENR Construction; telephone & telegraph, ICCT&T ENRC; electric and gas utilities, Handy-Whitman ENRC; petroleum pipeline, HW ENRC & ICC ENRC; all other private, aver ENRC & Assoc. General Contractors. Military and Naval, aver of Amer Appr, Bu of Public Roads ENRC, Fuller Boeckh, Turner Boeckh; highway, BuPR ENRC; sewer & water, aver AGC & ENRC; misc public service, aver HW ENRC; conservation & development and all other, aver AGC ENRC.



Building Cost and Price Indexes

Construction cost and price indexes may vary as to their content, coverage, and purpose, but there is no doubt that in 1956 all were headed into new high ground.

Cost indexes of materials and labor, illustrated by the weighted series listed in the **Building Cost and Price Index Roundup** table below, have moved upward between 3% and 4% in the first nine to eleven months of 1956.

The building contractor price indexes are up from 3% to 10% in the 12 months preceding the latest value shown in the roundup. Aberthaw and Austin top out at 10%; Turner is up 9%; Fuller, 4%; and Fruin-Colnon in St. Louis reports a 3% rise.

For the year through September, the Marshall and Stevens building price index is up 5%, while the Smith, Hinchman & Grylls index is up 3%.

In this September-to-September period, the ENR Building Cost Index climbed 4.4%.

On this page and the several pages following, ENR has rounded up a number of the construction industry's best known and special purpose cost and price indexes and compared many of them graphically with ENR's own Construction and Building Cost Indexes.

What These Indexes Cover

A variety of special purpose indexes is represented here. The contractor selling price indexes, appraisal indexes, accounting indexes. What each covers is defined in the following paragraphs and pages. The original bases are shown in the roundup table. These have been converted to 1913 = 100 for the table and charts, except as noted on the table.

- **Aberthaw Co., Boston, Mass.**—Since March 31, 1946, a composite of 36 major cost items in three multi-story and two one-story New England industrial buildings, including all mechanical trades. Repriced quarterly using actual and estimated labor and material costs. Before March 31, 1946, based on New England seven-story and basement, 62′4″ x 202′4″, reinforced concrete building built in 1914. Quarterly.

- **American Appraisal Company, Milwaukee, Wis.**—30-cities average used here. See accompanying page for definition and values for 22 cities. Monthly.

- **Associated General Contractors of America (AGC), Washington, D. C.**—Wages and materials for 12 cities combined in 40-60 ratio. Wages are prevailing rates for hod carriers and common labor. Materials are weighted: sand, gravel, and crushed stone, 1; cement, 1; lumber, 1; hollow tile, ½; structural and reinforcing steel, ½. Monthly.

- **Austin Co., Cleveland, Ohio.**—Reprices typical one-story, steel frame, monitor-type industrial building. Includes concrete foundations, brick curtain walls, continuous steel sash, concrete floor laid on ground, 2-in. wood roof deck on timber purlins covered with 4-ply waterproofing, monitor sash with mechanical operators, but no heating, lighting, plumbing, sprinkler, or other services. Priced for central and eastern states. Quarterly.

- **E. H. Boeckh & Associates Inc., Washington, D. C.**—20-cities average for five commercial and factory buildings price indexes used here. See page 99 for definition and values for 10 classes of buildings in 21 of the 47 U. S. cities covered. Monthly.

- **Fruin-Colnon Contracting Co., St. Louis, Mo.**—Industrial plant of five buildings in St. Louis repriced monthly on basis of contractor's actual and estimated material and labor costs. Monthly.

Building Cost and Price Index Roundup

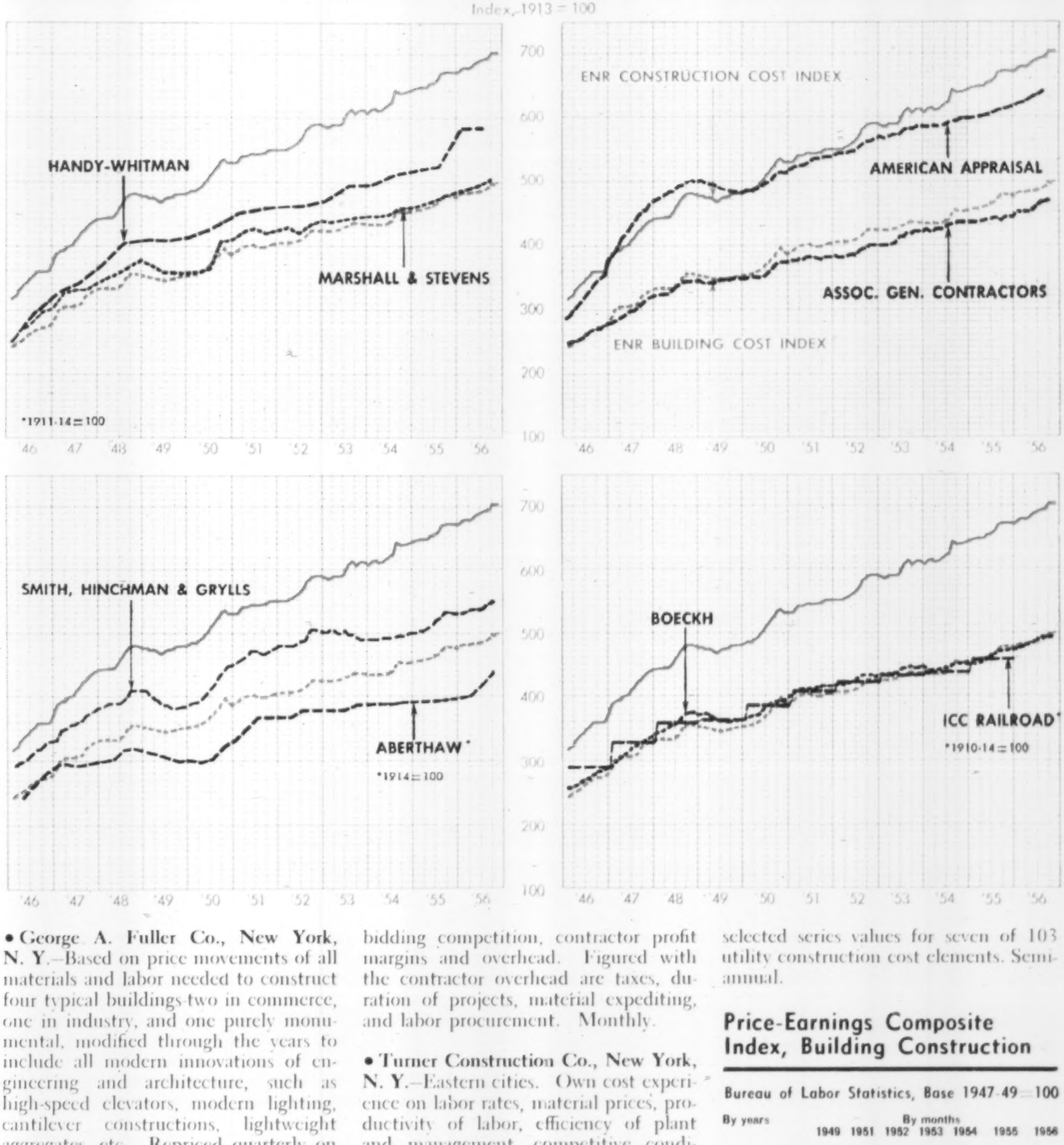
Yearly averages, 1913 = 100, converted where necessary from original base

WEIGHTED	Orig. Base	1926	1932	1939	1942	1945	1946	1948	1949	1951	1952	1953	1954	1955	1956
ENR Construction	1913 = 100	208	157	236	276	308	346	461	477	542	569	600	628	660	704 D
ENR Building	1913 = 100	185	141	197	222	239	262	345	352	401	416	431	446	469	500 D
American Appraisal*	1913 = 100	217	155	200	241	271	322	490	490	532	553	577	592	608	642 S
Assoc. Gen. Contr	1913 = 100	197	171	188	209	231	257	332	342	377	388	408	426	439	470 S
Boeckh, U. S. Comm. & Fac.**	1926-29 = 100	181	144	191	214	252	275	365	369	415	430	445	450	465	496 S
Marshall & Stevens	1926 = 100	185	130	183	218	248	288	368	365	430	436	448	459	479	508 S
Smith, Hinchman & Grylls**	1926 = 100	185	128	199	226	285	319	405	395	476	499	504	500	522	551 S
ICCRR Sta & Off Bldgs	1910-14 = 100†	184	141	166	208	244	291	364	368	412	426	438	442	460	
WR & A RC Bldg Pac Div	1911-14 = 100†	191	153	192	240	248	273	393	416	460	467	489	510	527	588 Jl

* Adjusted for estimated productivity. ** Includes overhead, profit; adjusted for estimated productivity.

CONTRACTOR	Orig. Base	1926	1932	1939	1942	1945	1946	1948	1949	1951	1952	1953	1954	1955	1956
Aberthaw	1914 = 100†	197	168	190	223	236	279	321	312	370	381	388	394	398	441 S
Austin	1926 = 100	185	117	152	213	234	273	317	307	337	342	347	352	366	407 S
Fruin-Colnon	1926 = 100	218	178	208	227	247	285	382	382	433	449	460	469	483	507 N
Fuller	1913 = 100	202	157	195	229	241	290	380	382	405	416	429	450	462	491 O
Turner	1939 = 100	195	136	182	245	263	318	422	414	478	490	500	489	498	551 O

† Not converted to 1913 = 100. • Jl July • S Sept • O Oct • N Nov • D Dec



• **George A. Fuller Co., New York, N. Y.**—Based on price movements of all materials and labor needed to construct four typical buildings-two in commerce, one in industry, and one purely monumental, modified through the years to include all modern innovations of engineering and architecture, such as high-speed elevators, modern lighting, cantilever constructions, lightweight aggregates, etc. Repriced quarterly on basis of company's experience throughout country.

• **Marshall and Stevens, Inc. of Illinois, Chicago, Ill.**—Building cost index used here. See accompanying page for its description and for industrial equipment cost indexes. Quarterly and annual for ENR.

• **Smith Hinchman & Grylls, Inc., Detroit, Mich.**—Actual in-place costs, using building material costs, freight rates, skilled and unskilled labor rates and including labor efficiency and premiums, bidding competition, contractor profit margins and overhead. Figured with the contractor overhead are taxes, duration of projects, material expediting, and labor procurement. Monthly.

• **Turner Construction Co., New York, N. Y.**—Eastern cities. Own cost experience on labor rates, material prices, productivity of labor, efficiency of plant and management, competitive conditions, forecast of price trends. Quarterly and special as needed.

• **Railroad Construction Cost Indexes ICC, Washington, D. C.**—Stations and office building series used here. See accompanying page for definition of this Interstate Commerce Commission analysis of major contracts. Annual.

• **Handy-Whitman, Whitman, Requardt & Associates, Inc., Baltimore.**—Reinforced concrete building in the Pacific Division series used here. See accompanying page for definition and selected series values for seven of 103 utility construction cost elements. Semiannual.

Price-Earnings Composite Index, Building Construction

Bureau of Labor Statistics, Base 1947-49 = 100

By years		By months							
			1949	1951	1952	1953	1954	1955	1956
'34	44.4	Yr	**103.7**	**119.9**	**121.6**	**126.2**	**128.9**	**133.5**	.....
'35	44.6								
'36	45.1	J	105.4	119.0	120.2	123.8	128.1	130.9*	137.5
'37	49.6	F	105.3	119.7	120.5	124.2	128.1	131.2*	137.7
'38	48.1	M	105.1	120.0	120.8	124.9	128.1	130.9*	138.4
'39	48.7	A	104.5	120.0	120.9	125.3	127.5*	131.5	138.9
'40	50.6	M	103.8	120.3	120.4	125.5	127.5*	131.9	138.8
'41	51.4	J	103.1	120.1	120.0	125.7	127.2*	132.2	139.1
'42	50.6								
'43	62.2	J	102.3	119.7	121.0	126.8	128.5*	133.6	139.3
		A	102.2	119.6	121.8	126.9	129.3	134.8	140.3
'44	64.9	S	102.4	120.2	122.7	127.3	130.0	135.7	140.8
'45	66.9								
'46	73.8	O	102.7	120.2	123.3	127.5	130.3*	136.3	.....
'47	93.4	N	103.0	120.5	123.3	127.4	130.6	136.1	.....
'48	103.0	D	103.8	120.2	123.5	127.9	131.9*	136.4	.....

*Revised

This Index combines **BLS Wholesale or Primary Price Index of Building Materials, weighted 61.4%, and BLS Index of Average Hourly Earnings in Building Construction, weighted 38.6%. Weights are based on BLS studies of 1939 projects. No adjustments are made for competitive** conditions, productivity or overhead.

Euclid 'TWINS' will move the CHEAPEST DIRT on the big road program ahead!

- Twin-Power "Eucs" out-perform all other equipment by a wide margin — the *profit* margin
- "Twins" move more yardage . . . wet or dry . . . hard clay or loose sand
- Contractors with "Twins" have a bidding advantage
- "Twins" can set new production records at lower cost on *your* jobs

Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE

GM
MORE POWER FOR YOU

TC-12 TWIN-CRAWLER TRACTOR
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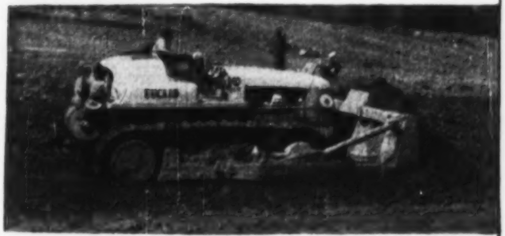
To move dirt at the lowest cost set your sights on Euclid "TWINS"

Because it self-loads in any scraper material, the Twin-Power Scraper works independent of other equipment. It is revolutionizing road building methods on jobs where concentration of equipment in any single cut is not practical.



Unequalled power, speed and maneuverability make the TC-12 a top performer. It has all the features you've wanted in a big crawler.

Ask your dealer for proof that Euclid "Twins" are your best investment

- **Check actual production figures from a wide range of jobs**
- **Compare "Twin" performance with that of your present equipment**
- **See movies of "Twins" at work on jobs like yours**
- **Check the list of owners who are using "Twins" to cut their earthmoving costs**

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EUCLID DIVISION, GENERAL MOTORS CORPORATION, Cleveland 17, Ohio

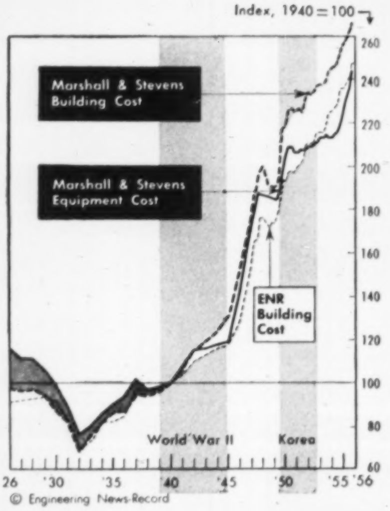
Industrial Equipment Cost Indexes

Marshall & Stevens, Inc. of Chicago, Illinois, 1926 = 100

Industry	1929	1932	1939	1945	1946	1947	1948	1949	1950	1953	1954	1955	9/56
Average of All	**91.9**	**66.1**	**84.8**	**103.4**	**123.2**	**150.6**	**162.8**	**161.2**	**167.9**	**182.5**	**184.6**	**190.6**	**211.3**
Commercial (av. 12*)	91.8	67.6	86.8	105.2	120.9	146.9	158.6	152.7	159.8	172.6	183.3	179.8	198.5
Transportation garage	91.5	69.2	83.6	100.9	123.9	157.0	171.1	170.3	179.7	197.0	199.0	205.5	230.5
Public util (av. 2*)	91.8	70.1	82.9	97.5	119.5	145.8	159.6	159.7	164.8	178.8	181.7	186.8	206.3
Process (av. 9*)	90.5	73.2	83.6	103.8	123.0	149.1	161.9	161.1	166.6	180.5	183.4	188.7	208.7
Food (av. 10*)	92.6	68.5	84.9	104.1	126.1	156.8	169.7	169.2	177.1	192.4	194.8	200.7	223.5
Metal working	92.3	67.9	83.6	110.7	131.2	151.3	161.8	161.8	166.9	181.0	184.1	189.3	209.1
Aircraft	93.0	66.7	85.0	109.8	127.0	162.9	178.3	177.5	186.1	203.8	205.8	213.4	239.7
Mach & parts, elec eq	92.0	68.0	83.4	106.8	130.3	156.6	167.4	167.7	175.0	191.4	194.6	200.2	221.1
Textile	91.1	67.8	83.7	101.8	122.1	146.6	157.4	157.3	165.9	198.0	199.8	206.6	231.4
Woodworking	92.0	67.2	83.6	100.9	123.0	149.6	160.4	160.4	165.5	172.3	182.3	187.5	207.0
General (av. 7*)	95.5	68.8	84.6	103.2	122.0	149.7	162.0	161.8	168.2	182.6	185.0	190.7	211.9
Cold storage refrig	92.0	70.0	82.1	101.7	125.7	163.2	176.6	175.8	185.2	202.8	204.8	211.6	237.3
Contractors' equipment	91.0	71.9	82.4	102.5	124.2	150.3	161.1	161.1	166.2	179.9	183.0	188.2	207.9

* In each of these groups, MARSHALL AND STEVENS reports separate comparative equipment cost trends for: COMMERCIAL: Apartment, bank, church, hotel, library, restaurant, school, store, theatre, hospital, dwelling, office GENERAL: Laundry, mining and milling, motion picture, printing, shipbuilding, warehouses, logging

PUBLIC UTILITY: Steam power, electric power
PROCESS: Distillery, cement, chemical, glass, petroleum industry, paint, paper, rubber, clay products
FOOD: Bakery, bottling, brewery, candy, cannery-fish, cannery-fruit, creamery, dairy (flour cereal feed), packing-fruit, packing-meat



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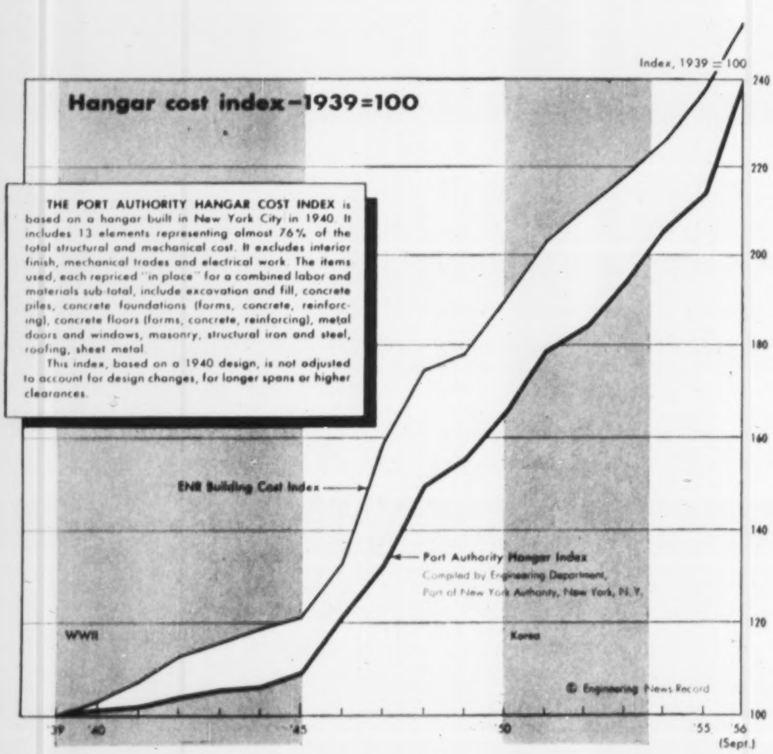
Industrial Building and Equipment Cost Indexes

Marshall & Stevens indexes cover both comparative building costs, 1902 to date, and comparative equipment costs, 1913 to date.

The building indexes are national averages with a system of modifiers to get regional and municipal values for each of four types of building: A—Fireproof, protected steel; B—Fireproof, reinforced concrete; C—Masonry buildings; D—Frame. They are designed to reflect normal costs in line with recognized or published prices of building materials, equipment, and labor. Extraordinary or intangible conditions are not included. Composite building cost series is converted to 1913 = 100 for table and chart on accompanying page.

Comparative equipment costs, developed to cover the composite of the entire plant, machinery of various kinds, mechanical installation, furniture and fixtures, hand tools and other items are combined in proper proportion to their average occurrence in each plant and computed for 47 industries. Eleven series are reproduced here, five of which are averages of three or more M&S related series. These are M&S estimates of actual cost paid for installed plant equipment, as a whole.



THE PORT AUTHORITY HANGAR COST INDEX is based on a hangar built in New York City in 1940. It includes 13 elements representing almost 76% of the total structural and mechanical cost. It excludes interior finish, mechanical trades and electrical work. The items used, each repriced "in place" for a combined labor and materials sub-total, include excavation and fill, concrete piles, concrete foundations (forms, concrete, reinforcing), concrete floors (forms, concrete, reinforcing), metal doors and windows, masonry, structural iron and steel, roofing, sheet metal.

This index, based on a 1940 design, is not adjusted to account for design changes, for longer spans or higher clearances.

American Appraisal Index

This index is based on detailed analysis of materials and labor required for four types of buildings (frame, brick, concrete, and steel) in 30 representative cities. It is repriced monthly in accordance with prevailing wage scales and labor performance for the various building trades and quotations for construction materials in 30 key cities in the United States. The index corrects for labor productivity but assumes normal average conditions and does not give any recognition to overtime or bonus payments to labor or premiums paid for materials in individual cases or under temporary abnormal conditions. It applies to construction only, does not include plumbing, heating, lighting, sprinklers, fixtures, and decorations.

Building Cost Index

American Appraisal Co., Milwaukee, Wis.

30-cities average and 22 individual cities, 1913 = 100

U. S. Av.,	'26	'32	'39	'42	'45	'49	'53	'54	'55	Aug. '56
30 cities	**217**	**155**	**200**	**241**	**271**	**490**	**577**	**591**	**608**	**641**
Boston	224	169	210	248	270	485	581	593	610	646
New York	234	170	219	248	272	503	594	626	634	681
Buffalo	219	157	205	247	279	506	605	619	635	675
Baltimore	224	166	198	248	277	510	585	595	606	648
Philadelphia	225	161	196	247	275	481	572	587	603	628
Pittsburgh	236	172	219	249	279	486	571	582	591	625
Cincinnati	217	157	209	242	272	477	556	571	589	612
Cleveland	233	160	206	245	268	485	577	592	609	649
Chicago	219	162	205	235	260	452	539	550	569	602
Indianapolis	219	157	206	247	276	501	584	606	622	642
Detroit	224	148	208	252	278	500	602	625	644	673
Milwaukee	218	144	209	254	280	493	609	615	632	689
Minneapolis	197	148	202	235	266	453	546	553	578	628
Kansas City	220	156	209	239	268	469	538	554	567	589
St. Louis	230	163	208	238	265	478	569	589	604	637
Atlanta	211	147	186	240	278	514	627	643	658	695
Dallas	204	146	171	209	246	455	527	533	545	564
New Orleans	217	145	194	234	277	501	589	604	622	644
Denver	204	149	195	226	245	441	518	522	540	569
Seattle	199	141	196	244	277	509	574	582	604	638
San Francisco	188	144	183	225	244	446	524	531	563	597
Los Angeles	195	141	167	213	249	475	549	556	586	624

How 3 hours of Drafting Time was Reduced To 15 Seconds . . .

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U. S. AVERAGE

Annual Averages By Cities	Residences Frame	Residences Brick	Apartments, Hotels, Office Bldgs. Wood	Apartments, Hotels, Office Bldgs. Brick and Conc.	Apartments, Hotels, Office Bldgs. Steel	Commercial & Factory Bldgs. Frame	Commercial & Factory Bldgs. Steel	Commercial & Factory Bldgs. Brick and Wood	Commercial & Factory Bldgs. Brick and Steel	Commercial & Factory Bldgs. Brick and Conc.
1926-29	101.4	102.5	102.5	102.8	101.3	102.2	100.8	101.7	102.2	104.6
1939	101.2	104.4	104.1	111.2	109.4	101.3	110.4	105.0	112.1	113.3
1946	161.8	161.9	161.7	154.0	154.8	165.6	145.0	158.7	154.8	156.0
1949	213.8	215.6	215.0	208.1	208.4	218.4	195.5	211.9	208.7	211.4
1950	225.9	227.1	226.7	216.5	217.0	231.3	203.2	222.2	217.4	218.8
1955	257.6	263.5	262.8	264.3	260.1	262.9	253.1	261.1	268.9	272.1
Oct 1956	270.3	277.4	277.0	281.0	276.9	275.3	275.1	276.0	288.8	289.2

ATLANTA AREA

Annual Averages By Cities	Residences Frame	Residences Brick	Apartments, Hotels, Office Bldgs. Wood	Apartments, Hotels, Office Bldgs. Brick and Conc.	Apartments, Hotels, Office Bldgs. Steel	Commercial & Factory Bldgs. Frame	Commercial & Factory Bldgs. Steel	Commercial & Factory Bldgs. Brick and Wood	Commercial & Factory Bldgs. Brick and Steel	Commercial & Factory Bldgs. Brick and Conc.
1926-29	82.7	87.0	84.2	83.7	87.0	82.9	94.5	84.7	87.5	86.8
1939	82.8	86.0	86.1	95.1	95.0	80.6	96.2	88.6	94.6	97.4
1946	149.2	148.1	148.2	136.8	139.9	151.7	130.0	146.8	135.1	136.4
1949	189.9	189.3	189.3	180.6	185.4	191.7	172.7	186.5	177.5	180.8
1950	196.2	194.3	194.7	185.4	191.0	199.3	183.0	190.0	185.0	183.7
1955	225.1	225.3	225.4	229.0	231.6	229.5	231.9	221.9	231.8	231.5
Oct. 1956	238.0	239.7	240.3	245.8	249.0	241.1	246.8	238.1	252.9	248.2

BALTIMORE AREA

Annual Averages By Cities	Residences Frame	Residences Brick	Apartments, Hotels, Office Bldgs. Wood	Apartments, Hotels, Office Bldgs. Brick and Conc.	Apartments, Hotels, Office Bldgs. Steel	Commercial & Factory Bldgs. Frame	Commercial & Factory Bldgs. Steel	Commercial & Factory Bldgs. Brick and Wood	Commercial & Factory Bldgs. Brick and Steel	Commercial & Factory Bldgs. Brick and Conc.
1926-29	107.2	112.0	107.6	100.6	100.7	106.3	95.5	106.8	96.8	101.2
1939	93.5	95.5	95.6	99.3	99.2	94.0	101.7	96.6	101.4	100.2
1946	163.1	161.7	162.2	149.1	150.8	167.6	138.9	158.8	150.0	148.2
1949	216.4	217.4	217.3	204.5	204.8	220.5	191.8	216.6	204.6	208.5
1950	231.0	231.8	232.1	215.0	216.8	234.9	204.2	230.6	217.7	216.5
1955	253.1	255.7	256.2	246.7	247.0	257.2	239.8	253.8	252.8	250.4
Oct. 1956	266.9	268.6	269.9	263.6	265.2	271.1	266.7	266.7	273.0	266.1

BIRMINGHAM AREA

Annual Averages By Cities	Residences Frame	Residences Brick	Apartments, Hotels, Office Bldgs. Wood	Apartments, Hotels, Office Bldgs. Brick and Conc.	Apartments, Hotels, Office Bldgs. Steel	Commercial & Factory Bldgs. Frame	Commercial & Factory Bldgs. Steel	Commercial & Factory Bldgs. Brick and Wood	Commercial & Factory Bldgs. Brick and Steel	Commercial & Factory Bldgs. Brick and Conc.
1926-29	91.7	96.7	94.1	95.5	96.8	90.2	97.5	94.6	96.3	96.3
1939	87.8	90.9	91.5	96.1	96.2	84.9	96.9	95.1	95.6	96.3
1946	149.3	147.4	147.9	137.3	139.4	149.7	128.1	145.4	135.2	137.4
1949	188.2	187.2	187.6	178.9	182.0	192.8	172.6	183.7	177.7	180.0
1950	196.3	196.1	196.8	186.6	189.4	200.6	179.2	193.9	186.2	187.6
1955	222.2	224.7	224.8	225.0	224.8	225.7	222.6	224.0	227.7	230.3
Oct. 1956	236.5	241.4	241.7	242.6	242.6	238.1	239.7	243.7	245.8	247.9

BOSTON AREA

Annual Averages By Cities	Residences Frame	Residences Brick	Apartments, Hotels, Office Bldgs. Wood	Apartments, Hotels, Office Bldgs. Brick and Conc.	Apartments, Hotels, Office Bldgs. Steel	Commercial & Factory Bldgs. Frame	Commercial & Factory Bldgs. Steel	Commercial & Factory Bldgs. Brick and Wood	Commercial & Factory Bldgs. Brick and Steel	Commercial & Factory Bldgs. Brick and Conc.
1926-29	116.3	120.3	115.4	106.2	107.0	118.8	106.3	112.5	108.7	105.8
1939	106.2	110.4	110.1	116.3	113.7	105.7	114.2	111.5	118.2	118.5
1946	167.0	166.5	166.0	156.8	156.6	172.1	147.1	161.1	158.5	160.4
1949	223.0	226.5	225.9	216.7	215.6	227.1	201.3	222.9	218.2	221.9
1950	234.6	237.8	236.8	227.3	225.5	240.3	210.9	231.8	229.8	232.5
1955	264.3	271.9	271.9	271.1	267.8	268.8	263.1	269.9	280.7	279.6
Oct. 1956	279.7	288.3	287.8	289.4	286.8	284.6	287.0	284.7	301.9	299.0

CHICAGO AREA

Annual Averages By Cities	Residences Frame	Residences Brick	Apartments, Hotels, Office Bldgs. Wood	Apartments, Hotels, Office Bldgs. Brick and Conc.	Apartments, Hotels, Office Bldgs. Steel	Commercial & Factory Bldgs. Frame	Commercial & Factory Bldgs. Steel	Commercial & Factory Bldgs. Brick and Wood	Commercial & Factory Bldgs. Brick and Steel	Commercial & Factory Bldgs. Brick and Conc.
1926-29	109.2	114.2	109.8	113.2	109.1	112.9	105.2	105.9	112.0	116.0
1939	110.6	112.5	111.1	123.6	118.7	114.2	117.6	109.3	122.6	127.6
1946	168.3	166.0	164.2	158.9	156.9	168.1	144.5	157.4	157.0	162.5
1949	219.2	218.3	216.1	210.6	208.7	229.1	193.3	207.7	210.4	215.1
1950	231.9	229.7	227.4	217.8	216.8	243.4	201.2	216.5	219.5	222.6
1955	270.7	272.9	270.2	275.6	267.6	283.2	256.6	260.2	277.8	285.8
Oct 1956	280.4	284.3	282.3	291.0	283.2	292.0	279.7	273.3	297.9	301.3

CINCINNATI AREA

Annual Averages By Cities	Residences Frame	Residences Brick	Apartments, Hotels, Office Bldgs. Wood	Apartments, Hotels, Office Bldgs. Brick and Conc.	Apartments, Hotels, Office Bldgs. Steel	Commercial & Factory Bldgs. Frame	Commercial & Factory Bldgs. Steel	Commercial & Factory Bldgs. Brick and Wood	Commercial & Factory Bldgs. Brick and Steel	Commercial & Factory Bldgs. Brick and Conc.
1926-29	100.5	105.0	101.3	101.6	100.2	100.2	99.6	103.1	100.6	101.0
1939	103.3	106.2	105.9	113.9	110.4	103.3	111.7	107.1	113.7	116.5
1946	165.6	166.8	166.7	154.5	154.7	167.5	140.7	166.4	154.4	156.1
1949	214.1	216.6	215.8	207.5	206.0	217.9	193.5	214.1	208.4	212.2
1950	220.3	224.1	223.1	213.9	211.7	224.3	199.1	220.4	215.6	218.7
1955	255.0	264.2	262.9	266.1	257.9	258.5	249.6	266.0	270.2	276.4
Oct. 1956	269.4	279.2	278.2	284.9	277.0	273.5	277.4	280.6	293.4	295.9

CLEVELAND AREA

Annual Averages By Cities	Residences Frame	Residences Brick	Apartments, Hotels, Office Bldgs. Wood	Apartments, Hotels, Office Bldgs. Brick and Conc.	Apartments, Hotels, Office Bldgs. Steel	Commercial & Factory Bldgs. Frame	Commercial & Factory Bldgs. Steel	Commercial & Factory Bldgs. Brick and Wood	Commercial & Factory Bldgs. Brick and Steel	Commercial & Factory Bldgs. Brick and Conc.
1926-29	107.2	113.4	108.5	111.3	108.3	109.0	103.0	107.2	110.5	114.8
1939	106.2	109.6	109.5	115.3	112.8	107.5	112.9	109.5	117.7	118.0
1946	169.2	169.4	168.7	160.2	159.9	174.1	146.4	164.3	161.0	165.9
1949	224.8	225.7	223.6	216.0	213.0	233.0	198.5	218.0	217.2	220.9
1950	237.9	237.8	235.4	227.8	224.1	248.1	207.2	227.6	228.4	232.3
1955	273.9	280.2	277.7	281.8	272.6	284.1	263.5	273.4	287.7	292.8
Oct. 1956	288.2	296.3	293.6	300.2	289.6	298.0	284.6	290.6	308.1	313.2

DALLAS AREA

Annual Averages By Cities	Residences Frame	Residences Brick	Apartments, Hotels, Office Bldgs. Wood	Apartments, Hotels, Office Bldgs. Brick and Conc.	Apartments, Hotels, Office Bldgs. Steel	Commercial & Factory Bldgs. Frame	Commercial & Factory Bldgs. Steel	Commercial & Factory Bldgs. Brick and Wood	Commercial & Factory Bldgs. Brick and Steel	Commercial & Factory Bldgs. Brick and Conc.
1926-29	103.1	107.3	103.2	98.9	99.1	103.6	100.5	100.9	99.4	99.7
1939	95.1	95.8	96.7	98.8	100.2	94.8	106.6	96.0	101.9	98.9
1946	150.2	148.8	149.4	139.8	144.4	153.5	140.3	144.6	142.6	141.1
1949	207.2	206.2	206.9	197.1	201.3	210.3	197.1	203.2	201.5	195.4
1950	220.5	221.2	222.1	209.0	212.5	221.3	206.3	218.6	210.1	208.3
1955	240.0	241.5	242.6	242.7	244.3	245.8	252.6	238.8	250.6	244.3
Oct. 1956	255.2	259.3	260.7	258.2	260.1	256.4	267.4	260.7	268.0	259.0

DENVER AREA

Annual Averages By Cities	Residences Frame	Residences Brick	Apartments, Hotels, Office Bldgs. Wood	Apartments, Hotels, Office Bldgs. Brick and Conc.	Apartments, Hotels, Office Bldgs. Steel	Commercial & Factory Bldgs. Frame	Commercial & Factory Bldgs. Steel	Commercial & Factory Bldgs. Brick and Wood	Commercial & Factory Bldgs. Brick and Steel	Commercial & Factory Bldgs. Brick and Conc.
1926-29	95.0	99.7	95.5	102.4	99.6	95.5	105.5	94.6	101.4	108.0
1939	112.1	112.0	111.2	116.1	114.4	114.3	118.7	109.5	117.0	117.8
1946	160.1	160.3	150.4	155.3	157.9	164.0	155.6	156.8	160.0	158.3
1949	212.9	215.8	215.9	211.0	213.1	216.2	207.0	214.3	214.6	215.3
1950	228.2	230.0	229.8	218.8	221.2	232.4	212.3	226.2	221.2	221.3
1955	260.9	266.6	266.3	266.3	264.7	264.2	261.9	265.4	271.7	273.2
Oct 1956	270.0	276.4	276.6	278.6	277.7	273.8	284.0	276.4	289.3	285.2

DETROIT AREA

Annual Averages By Cities	Residences Frame	Residences Brick	Apartments, Hotels, Office Bldgs. Wood	Apartments, Hotels, Office Bldgs. Brick and Conc.	Apartments, Hotels, Office Bldgs. Steel	Commercial & Factory Bldgs. Frame	Commercial & Factory Bldgs. Steel	Commercial & Factory Bldgs. Brick and Wood	Commercial & Factory Bldgs. Brick and Steel	Commercial & Factory Bldgs. Brick and Conc.
1926-29	103.3	108.4	104.3	102.9	102.4	103.7	103.1	103.5	103.3	104.4
1939	98.8	102.7	102.9	108.6	107.5	98.7	108.8	104.2	111.4	110.1
1946	165.9	165.9	165.8	157.4	157.9	171.3	147.5	160.9	160.0	159.7
1949	221.0	222.6	221.9	212.2	211.5	227.0	196.8	216.8	214.2	215.9
1950	233.0	234.0	233.3	222.8	222.0	240.0	208.1	227.1	226.0	225.7
1955	272.2	279.2	277.4	281.5	272.7	280.6	265.3	273.4	287.6	292.7
Oct. 1956	287.8	295.6	294.3	299.7	290.7	295.6	286.9	292.0	308.3	310.0

KANSAS CITY AREA

Annual Averages By Cities	Residences Frame	Residences Brick	Apartments, Hotels, Office Bldgs. Wood	Apartments, Hotels, Office Bldgs. Brick and Conc.	Apartments, Hotels, Office Bldgs. Steel	Commercial & Factory Bldgs. Frame	Commercial & Factory Bldgs. Steel	Commercial & Factory Bldgs. Brick and Wood	Commercial & Factory Bldgs. Brick and Steel	Commercial & Factory Bldgs. Brick and Conc.
1926-29	100.3	106.5	102.2	105.7	103.3	101.1	105.9	101.9	107.5	108.8
1939	104.4	109.9	109.8	118.3	115.4	103.8	117.2	113.0	120.0	121.6
1946	166.5	165.6	165.4	158.2	159.5	172.3	151.0	159.8	159.3	160.3
1949	215.9	216.7	216.3	209.0	211.1	221.8	199.4	210.0	211.3	211.5
1950	230.5	229.6	228.7	216.0	218.8	238.1	203.6	219.6	217.7	217.8
1955	261.1	266.2	265.9	263.6	260.4	267.9	254.3	261.2	268.8	273.1
Oct 1956	269.8	274.7	274.1	276.4	274.0	276.8	276.9	269.5	285.2	286.3

LOS ANGELES AREA

Annual Averages By Cities	Residences Frame	Residences Brick	Apartments, Hotels, Office Bldgs. Wood	Apartments, Hotels, Office Bldgs. Brick and Conc.	Apartments, Hotels, Office Bldgs. Steel	Commercial & Factory Bldgs. Frame	Commercial & Factory Bldgs. Steel	Commercial & Factory Bldgs. Brick and Wood	Commercial & Factory Bldgs. Brick and Steel	Commercial & Factory Bldgs. Brick and Conc.
1926-29	92.7	97.9	93.5	98.8	96.8	93.5	97.0	91.3	97.5	103.1
1939	93.6	97.2	97.5	103.7	105.0	95.6	109.5	96.8	106.2	104.9
1946	155.1	156.1	156.2	155.3	156.7	160.1	158.3	150.9	160.0	158.7
1949	203.2	207.0	206.0	209.9	210.7	205.3	201.2	201.8	210.2	212.4
1950	222.8	224.1	223.4	217.4	219.2	227.8	205.5	215.4	217.5	219.0
1955	256.6	262.1	260.9	269.3	265.5	263.6	262.0	254.8	273.9	278.0
Oct. 1956	266.9	273.6	272.9	286.5	281.6	274.4	283.8	266.5	293.6	296.4

MINNEAPOLIS AREA

Annual Averages By Cities	Residences Frame	Residences Brick	Apartments, Hotels, Office Bldgs. Wood	Apartments, Hotels, Office Bldgs. Brick and Conc.	Apartments, Hotels, Office Bldgs. Steel	Commercial & Factory Bldgs. Frame	Commercial & Factory Bldgs. Steel	Commercial & Factory Bldgs. Brick and Wood	Commercial & Factory Bldgs. Brick and Steel	Commercial & Factory Bldgs. Brick and Conc.
1926-29	92.8	98.2	94.6	95.6	96.1	92.8	100.0	93.9	97.9	98.4
1939	101.9	105.0	104.2	113.5	110.7	102.7	113.4	103.6	114.5	117.2
1946	163.7	167.0	167.5	156.5	155.7	164.9	142.6	168.2	157.2	159.5
1949	218.7	218.7	217.7	205.1	206.9	224.4	192.6	211.7	205.8	208.0
1950	228.2	227.9	227.0	210.1	213.2	234.4	198.2	220.3	215.6	211.3
1955	264.9	272.4	271.4	266.8	262.4	269.0	251.4	272.4	271.7	276.6
Oct. 1956	278.8	289.0	289.0	285.0	281.2	280.7	273.6	291.9	293.9	294.6

NEW ORLEANS AREA

Annual Averages By Cities	Residences Frame	Residences Brick	Apartments, Hotels, Office Bldgs. Wood	Apartments, Hotels, Office Bldgs. Brick and Conc.	Apartments, Hotels, Office Bldgs. Steel	Commercial & Factory Bldgs. Frame	Commercial & Factory Bldgs. Steel	Commercial & Factory Bldgs. Brick and Wood	Commercial & Factory Bldgs. Brick and Steel	Commercial & Factory Bldgs. Brick and Conc.
1926-29	93.3	96.3	93.4	86.5	90.6	93.3	93.7	91.5	89.5	86.5
1939	89.0	90.3	91.3	95.4	98.3	88.1	102.8	91.7	98.5	94.9
1946	148.9	147.7	148.2	138.6	142.8	151.2	138.7	145.4	142.0	138.7
1949	201.6	201.4	202.0	188.8	194.6	204.9	186.0	200.0	191.8	189.8
1950	211.7	210.3	211.0	196.2	203.1	215.8	194.4	206.4	199.5	195.3
1955	236.6	238.7	239.3	236.5	240.1	240.5	234.9	237.2	241.1	238.7
Oct. 1956	246.8	248.5	249.3	247.8	252.4	251.7	251.7	246.4	255.1	250.2

NEW YORK CITY AREA

Annual Averages By Cities	Residences Frame	Residences Brick	Apartments, Hotels, Office Bldgs. Wood	Apartments, Hotels, Office Bldgs. Brick and Conc.	Apartments, Hotels, Office Bldgs. Steel	Commercial & Factory Bldgs. Frame	Commercial & Factory Bldgs. Steel	Commercial & Factory Bldgs. Brick and Wood	Commercial & Factory Bldgs. Brick and Steel	Commercial & Factory Bldgs. Brick and Conc.
1926-29	133.3	138.4	131.9	122.8	120.4	137.5	113.1	127.4	123.2	125.3
1939	122.1	123.3	122.5	130.6	125.9	125.6	123.7	119.6	130.0	133.3
1946	182.4	181.8	181.1	177.2	174.6	188.1	158.6	177.4	174.8	179.0
1949	240.8	243.7	242.7	242.8	238.2	247.5	217.3	238.3	240.0	246.4
1950	254.5	256.2	255.2	249.5	246.1	262.1	224.2	249.7	248.0	251.5
1955	286.0	293.1	292.1	300.0	290.9	292.4	277.5	288.8	302.4	308.3
Oct. 1956	303.8	313.0	312.0	324.1	313.4	310.7	305.2	309.5	329.2	334.7

PHILADELPHIA AREA

Annual Averages By Cities	Residences Frame	Residences Brick	Apartments, Hotels, Office Bldgs. Wood	Apartments, Hotels, Office Bldgs. Brick and Conc.	Apartments, Hotels, Office Bldgs. Steel	Commercial & Factory Bldgs. Frame	Commercial & Factory Bldgs. Steel	Commercial & Factory Bldgs. Brick and Wood	Commercial & Factory Bldgs. Brick and Steel	Commercial & Factory Bldgs. Brick and Conc.
1926-29	100.3	106.3	103.7	105.9	103.1	98.1	101.9	104.2	104.1	107.5
1939	99.2	102.6	102.9	105.7	104.1	98.2	102.0	105.0	105.5	106.7
1946	165.0	163.9	164.9	153.2	154.6	169.0	141.2	161.1	152.7	154.0
1949	220.5	220.6	220.3	209.0	209.0	224.3	190.3	216.3	205.6	209.9
1950	234.4	235.1	234.8	221.2	220.7	239.3	202.0	230.5	218.8	222.8
1955	270.0	275.8	275.2	271.5	264.9	274.0	248.7	275.4	271.1	278.5
Oct. 1956	280.4	285.8	285.6	284.7	279.9	284.8	273.7	284.4	289.2	291.1

PITTSBURGH AREA

Annual Averages By Cities	Residences Frame	Residences Brick	Apartments, Hotels, Office Bldgs. Wood	Apartments, Hotels, Office Bldgs. Brick and Conc.	Apartments, Hotels, Office Bldgs. Steel	Commercial & Factory Bldgs. Frame	Commercial & Factory Bldgs. Steel	Commercial & Factory Bldgs. Brick and Wood	Commercial & Factory Bldgs. Brick and Steel	Commercial & Factory Bldgs. Brick and Conc.
1926-29	113.3	118.8	112.8	111.2	107.1	115.4	89.6	112.2	104.6	112.9
1939	113.8	117.0	115.7	117.5	114.2	114.2	109.8	116.5	116.9	119.1
1946	169.5	169.0	168.0	156.6	155.3	173.5	140.1	166.4	153.2	158.9
1949	227.1	229.1	227.7	215.6	212.2	231.3	186.9	227.0	209.8	219.8
1950	237.6	238.6	237.6	222.2	219.8	242.6	196.6	235.3	218.9	224.2
1955	270.3	277.2	275.9	270.9	264.1	274.3	246.1	277.1	271.6	278.4
Oct. 1956	282.5	290.2	288.8	287.2	279.9	287.8	267.1	289.7	289.8	296.8

ST. LOUIS AREA

Annual Averages By Cities	Residences Frame	Residences Brick	Apartments, Hotels, Office Bldgs. Wood	Apartments, Hotels, Office Bldgs. Brick and Conc.	Apartments, Hotels, Office Bldgs. Steel	Commercial & Factory Bldgs. Frame	Commercial & Factory Bldgs. Steel	Commercial & Factory Bldgs. Brick and Wood	Commercial & Factory Bldgs. Brick and Steel	Commercial & Factory Bldgs. Brick and Conc.
1926-29	118.6	121.1	115.7	109.9	108.8	121.3	103.3	111.7	107.7	109.3
1939	107.0	110.2	109.9	118.7	116.4	107.6	114.3	110.3	119.2	119.8
1946	167.4	167.1	166.2	159.1	158.9	171.7	145.3	154.8	158.1	161.1
1949	220.7	221.4	220.7	212.8	212.4	226.8	197.5	217.3	213.6	215.7
1950	230.7	232.8	233.7	221.9	220.9	240.1	204.7	229.5	222.8	225.3
1955	266.5	273.3	272.2	272.2	265.7	272.6	255.0	271.5	276.5	281.3
Oct 1956	280.5	289.1	288.1	289.2	282.1	286.4	277.1	288.8	296.3	300.4

SAN FRANCISCO AREA

Annual Averages By Cities	Residences Frame	Residences Brick	Apartments, Hotels, Office Bldgs. Wood	Apartments, Hotels, Office Bldgs. Brick and Conc.	Apartments, Hotels, Office Bldgs. Steel	Commercial & Factory Bldgs. Frame	Commercial & Factory Bldgs. Steel	Commercial & Factory Bldgs. Brick and Wood	Commercial & Factory Bldgs. Brick and Steel	Commercial & Factory Bldgs. Brick and Conc.
1926-29	87.7	93.7	90.4	97.5	96.5	86.1	95.5	91.8	95.9	99.0
1939	99.2	105.7	104.5	117.4	114.4	97.6	114.9	107.4	116.5	121.9
1946	157.5	159.7	160.0	157.9	159.0	160.5	151.5	158.4	160.0	159.3
1949	207.1	213.0	212.8	214.0	213.9	210.0	203.9	213.9	216.1	219.8
1950	223.1	227.0	226.8	222.4	222.9	226.1	209.1	224.5	222.6	224.5
1955	259.6	268.0	267.2	275.0	269.5	264.6	262.9	266.8	279.6	284.4
Oct. 1956	271.8	281.0	280.2	293.4	287.8	277.4	287.7	279.1	301.0	302.5

SEATTLE AREA

Annual Averages By Cities	Residences Frame	Residences Brick	Apartments, Hotels, Office Bldgs. Wood	Apartments, Hotels, Office Bldgs. Brick and Conc.	Apartments, Hotels, Office Bldgs. Steel	Commercial & Factory Bldgs. Frame	Commercial & Factory Bldgs. Steel	Commercial & Factory Bldgs. Brick and Wood	Commercial & Factory Bldgs. Brick and Steel	Commercial & Factory Bldgs. Brick and Conc.
1926-29	84.5	92.2	89.2	101.7	95.1	82.4	100.8	92.2	100.5	105.9
1939	96.7	104.4	103.8	149.2	114.9	94.4	115.1	108.3	118.7	125.3
1946	152.9	158.3	157.9	161.2	159.8	154.3	156.0	158.9	164.2	167.1
1949	203.9	214.3	214.0	220.7	218.1	205.2	209.9	218.0	225.3	228.5
1950	213.6	224.1	224.0	227.1	224.7	214.3	214.1	227.8	230.3	234.5
1955	243.3	260.6	260.5	273.7	266.3	241.8	261.9	269.7	282.4	287.3
Oct. 1956	253.5	273.8	274.3	251.0	283.2	250.4	285.6	286.6	303.1	305.6

WASHINGTON, D. C.

Annual Averages By Cities	Residences Frame	Residences Brick	Apartments, Hotels, Office Bldgs. Wood	Apartments, Hotels, Office Bldgs. Brick and Conc.	Apartments, Hotels, Office Bldgs. Steel	Commercial & Factory Bldgs. Frame	Commercial & Factory Bldgs. Steel	Commercial & Factory Bldgs. Brick and Wood	Commercial & Factory Bldgs. Brick and Steel	Commercial & Factory Bldgs. Brick and Conc.
1926-29	106.6	107.7	107.9	107.1	105.9	106.0	104.0	108.0	106.4	108.4
1946	168.5	166.2	167.1	157.1	158.2	173.6	145.2	162.6	157.2	156.6
1949	223.1	223.3	223.1	213.5	212.6	227.2	194.8	218.6	210.4	214.6
1950	235.0	233.7	233.8	224.2	224.5	240.5	210.2	227.5	223.8	222.0
1955	262.6	264.4	264.7	262.5	260.2	269.6	254.3	258.8	267.9	267.3
Oct. 1956	276.2	278.9	279.1	282.0	279.1	284.3	284.2	272.1	292.8	287.9

Current indexes are calculated upon an actual survey at source of local construction cost conditions. Material prices used are those paid by contractors to material dealers.

Labor rates are current rates paid by contractors — certain corrections being made in certain areas for labor efficiency and labor shortage. Index includes construction overhead sales taxes, compensation insurance and social security. The indexes have been primarily engineered to use as local cost conversion factors to construction cost data released by the Boeckh organization. Complete formula is published in "Boeckh's Index Calculator Table."

Where Boeckh index is shown in these pages on charts or tables for comparison with other building cost indexes, the "National" average for all five Boeckh commercial and factory building indexes in 20 (of 47) U. S. cities is used, converted to 1913 = 100.

HOW ONE COMPANY Saves $50,000 EVERY FIVE YEARS ON Concrete Floors

30 years ago, before building a new plant, this company made a five year study of floor costs covering:

- initial cost
- cost of maintenance
- cost of repairs
- cost of production shut-downs due to floors

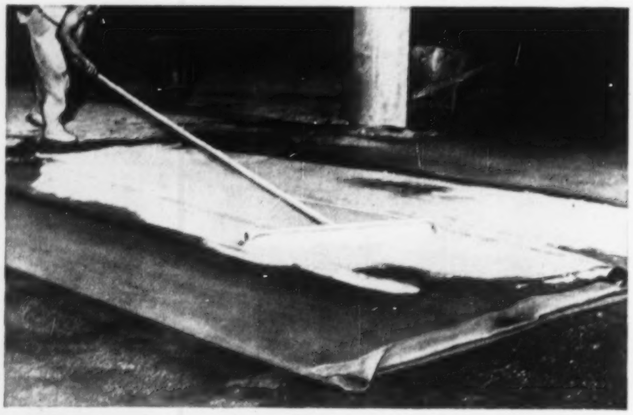
1. *Absorption blankets are placed on top of the freshly placed and screeded floor.*

Here's How the Study was made:

- Test patches of 6 different types of industrial flooring were installed.
- Each section was subjected to all demands of the operation.
- All, save ONE, showed signs of deterioration beginning in the FIRST YEAR.
- After five years ALL, save ONE, had disintegrated.

Result:

400,000 square feet of the successful floor was laid in the new factory. That was 25 years ago!



2. *Kalman crews spread the drying mixture. This acts as a blotting agent and "sucks" up moisture below surface.*

What does this mean:

If one of the 5 unsuccessful floors had been put down without testing—then after five years—

A large portion of the 400,000 sq. ft. of the plant floor would have had to be resurfaced, PLUS, during the five years there would have been

- excessive cost of maintenance
- danger to product because of "dusting"
- production interruptions because of floor repairs.

The plant management estimates that in the five 5-year periods, floor costs would have been in excess of $200,000.

3. *After proper time has elapsed for obtaining proper water-cement ratio, blanket is removed. Topping now has achieved density to point where it can support weight of man.*

For complete case histories write Kalman Floor Company, Inc., 110 East 42nd Street, New York 17, N. Y.

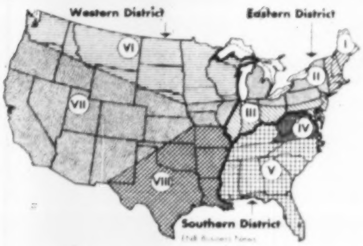
*

The successful floor* is still in excellent condition despite **increased production, new, heavier, faster materials handling equipment,** and **plant modernization.** And cost of **maintenance?** Less than 1¢ per sq. ft. per year.

KALMAN FLOOR COMPANY, INC.
110 East 42nd St., New York 17

District Offices:
Atlanta
Boston
Charlotte
Chicago
Cleveland
Dayton
Detroit
Houston
Los Angeles
Philadelphia
San Francisco

K*alman
Absorption Process
CONCRETE FLOORS



Railroad Cost Index Road Construction

Interstate Commerce Commission —1910-14 = 100

Dist & Reg.		%	1926	1932	1939	1945	1949	1954	1955
I to VIII		**68 40**	**166**	**131**	**137**	**197**	**270**	**320**	**330**
I	East	73 72	173	134	140	206	287	332	342
II	East	66 47	168	133	141	202	283	333	344
III	East	65 37	168	132	144	205	286	334	345
IV	South	63 48	163	126	131	195	259	311	320
V	South	68 79	164	129	136	195	265	317	326
VI	West	72 27	164	129	132	190	253	309	317
VII	West	68 79	166	131	133	188	256	308	318
VIII	West	71 97	167	133	140	198	270	321	329

Indexes represent territorial index factors and are not for determining unit reproduction costs for individual roads.

By Accounts	1926	1932	1939	1945	1949	1954	1955
Engineering	166	131	137	197	270	320	330
Other rt of way exp	159	121	135	201	258	281	286
Grading	153	106	90	144	139	144	147
Tunnels & subways	178	119	140	236	339	367	365
Brdg. culv & trestl	170	122	149	240	374	418	428
Elevated structures	165	129	149	249	382	450	461
Ties	173	144	158	241	302	360	364
Rails	144	140	136	152	245	326	346
Other track material	177	163	167	176	278	351	367
Ballast	175	146	143	181	254	312	314
Trk laying & surf	188	164	165	273	366	443	459
Fences snw sheds	178	147	140	189	279	340	353
Stat & off bldgs	184	141	166	244	368	442	460
Roadway buildings	187	140	162	258	386	443	462
Water stations	182	147	166	227	327	384	400
Fuel stations	180	144	159	242	357	421	434
Shops & eng houses	185	137	165	248	379	450	468
Grain elevators	190	137	164	236	367	440	457
Storage warehouses	189	137	166	253	377	458	474
Wharves & docks	177	136	153	255	350	402	415
Coal & ore, wharves	174	136	153	236	341	388	396
Tel & Tel lines	157	121	129	173	250	317	322
Sgnls & intrlocks	169	130	143	176	226	296	307
Power plants	186	138	167	246	386	477	497
Powr trnsmissn sys	176	143	148	180	266	338	355
Misc struct	186	141	161	229	378	449	465
Roadway mach	151	138	154	187	270	333	349
Roadway small tools	190	155	180	200	315	416	430
Public impr const	169	131	142	217	321	347	357
Shop mach	186	155	202	236	324	386	402
Power plant mach	186	155	180	191	242	300	311
Work equipment	180	165	200	254	348	427	442

Ratio of RR costs

Road construction	66 66
Equipment, work	0 54
Equipment, rolling & floating	26 38
General	6 42
Total	100 00

Indexes released August 1956, by Engineering Section, Bureau of Accounts, Cost Finding and Valuation, Interstate Commerce Commission, include items developed from analysis of major construction contracts over a period of years. Indexes for material accounts are based on studies of carriers' returns to Valuation Order 14, joint studies made with various subcommittees of President's Conference Committee, engineering and trade publications, contracts covering major construction projects, and information furnished by individual carriers.

Handy-Whitman Index—Public Utility Costs

Whitman, Requardt and Associates, Baltimore, Md.

Individual series for 103 cost elements in three classes of utility construction, for six geographic divisions of the United States, are reported semi-annually. Weighting is based on wide experience in cost analysis of plants and construction. Material prices are from ENGINEERING NEWS-RECORD, Iron Age and various manufacturers; labor rates from BLS, unions and builders associations.

Building construction—1911 to 1914 = 100

**(Complete Index reports 14 Items entering into Building Construction Costs.)
A relates to Reinforced Concrete Bldg.; B relates to Brick Bldg.**

	Jan. '26	July '26	Jan. '32	July '32	Jan. '39	July '39	Jan. '42	July '42	Jan. '45	July '45	Jan. '49	July '49	Jan. '50	July '50	July '51	July '52	July '53	July '54	Jan. '55	July '55	Jan. '56	July '56
North Atlantic Division																						
A	213	213	171	159	205	207	250	253	259	260	436	433	437	448	479	485	519	534	540	547	608	600
B	228	229	189	173	211	214	246	250	262	265	429	421	424	436	474	479	503	523	525	527	569	572
South Atlantic Division																						
A	213	215	171	164	204	205	260	267	274	275	462	453	465	469	510	517	556	569	578	587	642	649
B	226	228	185	176	209	211	255	262	272	277	431	431	434	439	485	488	516	536	543	551	589	598
North Central Division																						
A	203	201	169	154	200	200	237	242	249	253	421	418	423	437	468	481	520	526	533	542	595	603
B	212	211	181	164	203	203	229	234	248	250	389	390	394	408	440	453	183	497	503	513	545	554
South Central Division																						
A	192	191	149	144	188	187	232	236	242	243	411	412	418	422	454	460	494	504	508	515	566	573
B	203	204	160	154	191	191	223	227	235	238	382	382	387	392	424	438	460	474	478	486	520	535
Plateau Division																						
A	198	197	153	149	194	194	230	235	238	239	402	397	400	417	451	456	480	495	499	506	556	563
B	211	210	167	163	199	200	221	227	231	233	396	395	396	410	442	447	464	481	485	492	520	532
Pacific Division																						
A	191	190	157	148	192	192	238	241	248	248	416	415	420	432	463	468	501	518	524	529	588	588
B	198	197	164	156	193	193	226	231	241	242	386	385	389	400	435	443	466	479	488	498	536	539

Gas plant construction—1911 = 100

**(Complete Index reports 25 Items entering into Gas Plant Construction Costs.)
A relates to Total Constr. & Equip.; B relates to Mech. Equip. Exclusive of Gas Holders.**

	Jan. '26	July '26	Jan. '32	July '32	Jan. '39	July '39	Jan. '42	July '42	Jan. '45	July '45	Jan. '49	July '49	Jan. '50	July '50	July '51	July '52	July '53	July '54	Jan. '55	July '55	Jan. '56	July '56
North Atlantic Division																						
A	230	230	202	188	241	249	272	275	283	288	469	464	467	476	519	536	561	589	600	605	648	672
B	212	212	209	195	274	278	297	299	296	301	447	481	479	485	549	554	590	609	615	615	672	715
South Atlantic Division																						
A	219	222	178	175	227	230	261	268	278	282	464	453	456	457	507	520	543	568	581	591	623	651
B	212	212	209	195	274	278	297	299	296	301	481	482	479	485	549	554	590	609	615	615	672	715
North Central Division																						
A	217	218	198	178	232	232	249	254	264	269	435	434	437	447	489	503	531	554	565	572	602	630
B	212	212	209	195	274	278	297	299	296	301	447	481	479	485	549	554	590	609	615	615	672	715
South Central Division																						
A	199	200	171	160	216	217	244	249	258	261	420	419	425	429	470	475	496	522	532	538	566	595
B	212	212	209	195	274	278	297	299	296	301	447	487	479	485	549	554	590	609	615	615	672	715
Plateau Division																						
A	202	202	176	166	216	217	232	237	240	243	403	398	401	405	449	460	476	501	511	517	545	575
B	212	212	209	195	274	278	297	299	296	301	447	481	479	485	549	554	590	609	615	615	672	715
Pacific Division																						
A	205	206	187	177	227	228	253	257	264	266	433	428	433	437	480	494	516	541	555	561	599	620
B	212	212	209	195	274	278	297	299	296	301	447	481	479	485	549	554	590	609	615	615	672	715

Electric light and power construction—1911 = 100

**(Complete Index reports 64 Items entering into Electric Light and Power Construction Costs.)
A relates to Total Constr. & Equip. All steam; B to Accessory Electric Equipment; C to Sub-Sta. Equip.**

	Jan. '26	July '26	Jan. '32	July '32	Jan. '39	July '39	Jan. '42	July '42	Jan. '45	July '45	Jan. '49	July '49	Jan. '50	July '50	July '51	July '52	July '53	July '54	Jan. '55	July '55	Jan. '56	July '56
North Atlantic Division																						
A	197	194	182	176	224	225	248	248	251	259	401	400	399	409	468	480	506	517	519	524	555	577
B	197	196	192	186	225	224	241	239	226	237	340	341	341	360	420	430	457	460	461	468	463	490
C	184	178	172	168	203	203	217	216	207	218	306	312	312	320	359	366	392	396	396	400	417	444
South Atlantic Division																						
A	201	201	188	180	232	233	262	267	268	273	430	422	422	430	490	504	536	547	551	559	589	616
B	200	203	200	191	239	240	260	262	247	248	357	356	358	374	431	442	474	482	485	494	484	512
C	187	183	180	173	217	218	235	237	227	228	322	325	327	333	370	377	409	417	419	425	439	466
North Central Division																						
A	190	187	186	174	219	218	235	238	238	243	375	374	374	382	443	456	489	495	498	504	533	555
B	189	188	199	186	224	223	229	231	216	218	309	307	310	324	382	391	419	424	425	432	429	451
C	178	171	181	169	203	202	207	209	198	200	278	280	282	286	326	333	359	364	365	369	388	409
South Central Division																						
A	184	183	179	171	218	218	245	246	248	251	391	390	390	398	454	465	496	506	508	515	541	567
B	187	189	200	190	231	230	250	248	235	235	341	340	340	357	415	423	453	460	462	470	461	488
C	175	171	181	173	210	209	226	226	217	217	310	311	311	319	352	356	385	392	394	398	412	438
Plateau Division																						
A	190	188	177	171	218	219	234	236	238	241	378	378	376	386	443	454	482	493	495	500	527	553
B	197	196	194	188	231	232	237	236	225	225	322	323	323	341	399	408	437	440	441	446	435	457
C	185	177	175	171	209	211	213	212	207	207	289	294	294	302	341	347	374	378	378	381	392	413
Pacific Division																						
A	180	178	172	163	216	215	235	242	242	244	383	380	379	389	450	459	486	495	499	503	535	557
B	178	177	182	170	222	222	231	240	225	225	328	323	323	343	408	413	437	438	440	447	446	471
C	167	161	164	155	203	202	210	219	208	208	298	297	297	307	357	359	382	384	385	390	411	435

Symons FIELD REPORT...

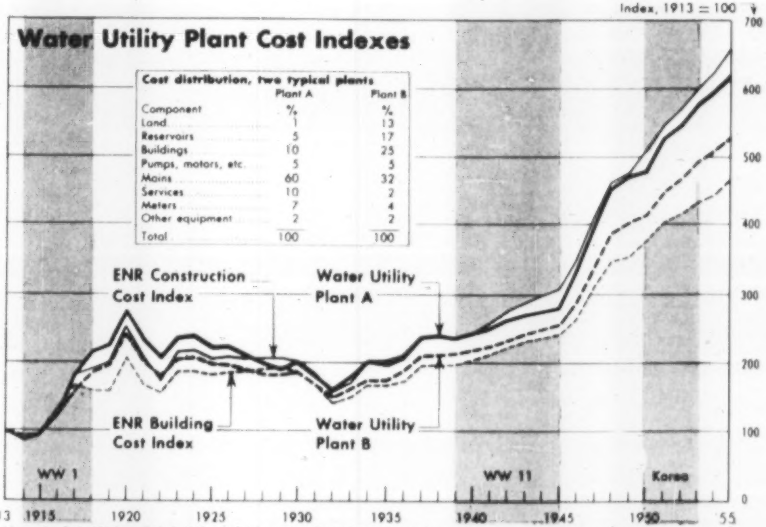
Only 3 Walers Used with Symons Forms on 16′ High Wall

Henry Carlson Construction Company, Sioux Falls, South Dakota, used only 3 walers with Symons Forms on 16′ high 12″ thick wall for City Water Treatment Plant, Sioux Falls. 10,000 square feet of Symons Panels were reused 12 times on the job, resulting in considerable saving of labor, material and a fast forming schedule.

To make it easier to pour these high walls certain of the upper panels were, at regular intervals, raised 1 foot to permit pouring through side openings for the first 8 feet of concrete. This avoided dropping concrete from the top.

Send the plans for your next job and our engineers will prepare a complete form layout, bill of materials, and make recommendations for the most efficient and cost saving method of forming—no obligation. Symons Forms, Clamps and Shores can be rented with purchase option.

Catalogs and additional information on Forms—Clamps—Shores sent on request. Symons Clamp & Mfg. Co., 4265 Diversey Avenue, Dept. M-6, Chicago 39, Illinois.



Water Utility Plant Cost Indexes

Cost distribution, two typical plants

Component	Plant A %	Plant B %
Land	1	13
Reservoirs	5	17
Buildings	10	25
Pumps, motors, etc.	5	5
Mains	60	32
Services	10	2
Meters	7	4
Other equipment	2	2
Total	100	100

Henry H. Fick, Weber, Fick & Wilson, Public Utility Consultants, Harrisburg, Pa

Indexes Used to Develop Fick Waterworks Property Component Cost Indexes

Indexes 1913 = 100

Building	1926	1932	1939	1940	1949	1954	Dec. 1954	1955	Dec. 1955
Engineering News-Record Building Cost Index	185.0	140.9	197.4	202.8	351.8	445.7	456.8	468.8	478.7
E. H. Boeckh & Assoc brick & concr comm & factory bldg, Pittsburgh, Pa. area	210.3	161.7	223.9	224.2	413.2	510.2	514.1	523.3	535.9
ICC Railroad constr index, station & office buildings, Region 111 (1910-14 = 100)	185.0	142.0	168.0	177.0	369.0	447.0		466.0	
Handy-Whitman brick buildings index, North Atlantic Division	229.0	175.3	214.0	218.3	423.8	513.8	521.0	536.0	569.0
Materials									
6-in & larger cast-iron pipe, Delaware River Foundries#	220.9	139.3	212.9	223.1	415.2	515.0	515.0	524.6	537.8
3-in & under stee pipe private sources*	187.5	171.9	155.4	155.4	249.7	328.0	334.3	349.2	360.2
Motors, based on Handy-Whitman Index, North Atlantic Division	134.2	134.0	147.8	147.0	232.0	317.0	317.0	320.3	338.0
Contractors' equipment, based on Marshall & Stevens index	158.7	114.1	130.8	132.4	255.7	290.5	289.7	298.7	309.0
Office equipment, based on Marshall&Stevens index	136.8	101.1	123.5	127.2	220.9	252.7	252.3	262.0	267.4
Meters, private sources	162.5	162.5	147.7	147.7	265.9	332.7	332.7	351.7	356.2
Common Labor, based on Engineering News-Record labor index, 20-city average	288.4	224.7	359.5	367.9	763.2	1,042.1	1,063.2	1,084.7	1,103.7
Construction, based on Engineering News-Record Construction Cost Index	208.0	157.0	235.5	242.0	477.0	628.0	642.7	659.7	673.1
Gas utility costs, based on Handy-Whitman ndex, North Atlantic Division	212.0	174.5	229.6	235.2	432.9	545.2	555.6	569.0	600.0

Replaces index based on Iron Age Index
* Replaces wrought iron pipe in the SERVICES INDEX 1913 to date see table, upper right)

Petroleum Refinery Construction Cost Index

Compiled by W. L. Nelson, Petroleum Refinery Engineering Consultant, published by Oil & Gas Journal, Tulsa, Oklahoma—1946 = 100

	1926	1932	1939	1942	1945	1949	1950	1951	1952	1953	1954	1955	Sep 1956
NELSON Refinery Construction Index 1946 = 100	*72.0	*56.6	*76.6	*83.7	*89.9	139.7	146.2	157.2	163.6	173.5	179.8	184.2	199.3
EQUIPMENT													
Heat exchangers	75.0	60.0	76.0	93.5	91.9	133.0	140.0	152.0	165.8	174.9	171.7	156.8	197.8
Instruments (control)		90.0	89.5	85.5	90.6	122.0	127.8	142.3	146.2	151.8	154.6	162.9	181.9
Pumps, compressors etc			91.5	87.5	93.9	135.9	138.2	155.9	155.6	162.5	166.5	172.2	196.6
Electrical equipment	81.0	57.0	68.5	74.0	81.8	130.9	134.9	154.3	152.4	156.4	160.0	162.5	177.8
Internal combustion engines			84.5	84.5	91.7	124.8	126.0	146.1	146.5	148.1	150.5	153.2	163.6
Miscellaneous equipment average	*94.0	*79.0	*82.0	*85.0	*90.0	†121.6	†126.2	†146.1	153.3	158.8	160.7	161.5	183.5
MATERIALS		68.0	82.0	86.3	89.7	143.6	149.5	164.0	164.3	172.4	174.6	176.1	196.7
LABOR		49.0	73.0	82.0	90.0	137.1	144.0	152.5	163.1	174.2	183.3	189.6	201.0

* Approximate, projection back to these dates from other cost sources.
† Used to compute index until Apr 1952. Slightly different from the average of the miscellaneous equipment items shown

Equipment prices, mainly from manufacturers as quoted to Oil & Gas Journal *Materials Component rom Bureau of Labor Statistics Wholesale Price Index, Code 10-1 Iron and Steel and Code 13, Building Materials *Labor, half skilled and half common labor as quoted by Engineering News-Record. For base costs see ENR Oct. 8, 1953, p 115

Waterworks Property Cost Index Components—1913 = 100

Henry H. Fick, Weber, Fick & Wilson, Public Utility Consultants, Harrisburg, Pa.

Year	Reservoirs	Buildings	Pumps and Motors	Distribution System	Services*	Meters	Other Equipment
1926	208.0	210.3	134.2	241.1	230.9	175.0	147.0
1932	157.0	161.7	134.0	164.9	194.6	168.7	107.1
1939	235.5	223.9	147.8	256.8	243.2	168.8	126.9
1940	242.0	224.2	147.0	266.6	246.8	169.7	129.7
1941	257.8	229.9	147.0	273.5	256.8	189.8	140.0
1942	276.3	239.8	154.0	283.1	270.6	201.9	151.6
1943	289.9	247.9	154.0	290.9	281.6	204.5	152.5
1944	298.7	261.8	145.8	295.0	287.5	205.9	154.4
1945	307.7	278.2	148.2	303.1	294.5	207.5	155.9
1946	346.0	298.7	173.8	360.2	329.9	222.5	185.1
1947	413.2	341.0	210.0	430.5	385.2	235.6	225.3
1948	460.7	394.9	218.8	505.9	439.5	288.9	242.2
1949	477.0	413.2	232.0	519.5	470.5	315.6	237.0
1950	509.6	421.4	251.2	533.3	496.4	336.4	246.3
1951	542.7	448.1	297.0	589.9	528.3	364.5	249.0
1952	569.4	467.1	296.5	613.9	560.1	370.8	248.8
1953	600.0	495.3	308.5	651.6	604.3	384.8	265.7
Dec. 1953	611.3	507.9	317.0	665.2	620.3	401.0	270.3
1954	628.0	510.2	317.0	673.1	635.1	403.6	270.4
Dec. 1954	642.7	514.1	317.0	679.5	647.8	405.7	269.7
1955	659.7	523.3	320.3	692.6	665.4	425.0	279.3
Dec. 1955	673.1	535.9	338.0	707.6	679.9	431.0	287.1

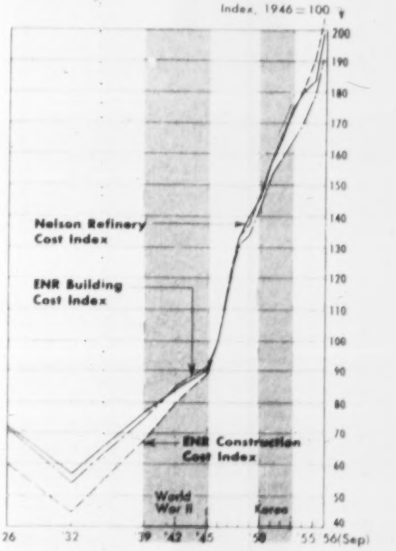
* Revised steel pipe substituted for wrought iron pipe 1913 to date based on 3-in. & under diam. steel pipe.

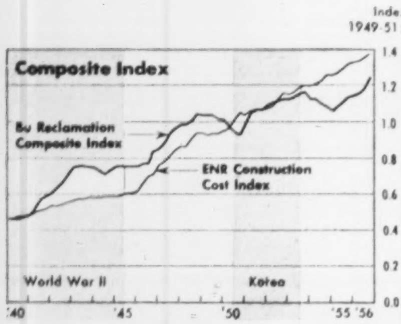
These special purpose indexes, tailored to fit individual waterworks properties, are compared here with the ENR general purpose cost indexes together with an illustration of how two properties can vary in cost trends depending on the ratio of treatment plant and other buildings to supply and distribution system.

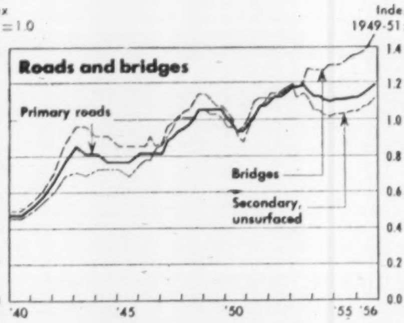
For more detail on the purpose and construction of these indexes see ENR Oct. 8, 1953, p. 113.

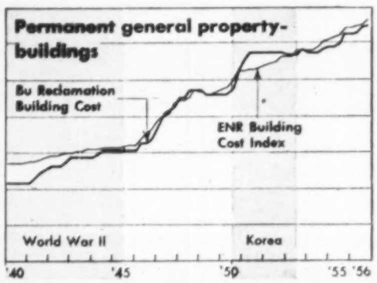
Nelson Refinery Cost Index

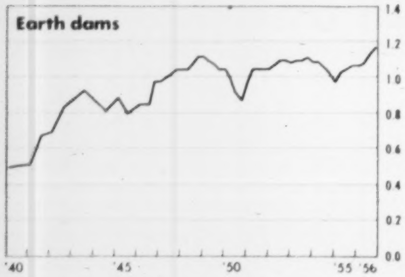
This index applies to the costs of constructing refinery and natural gasoline plants since 1946, projected back to 1926. For more detail see ENR Oct. 8, 1953, p. 115.

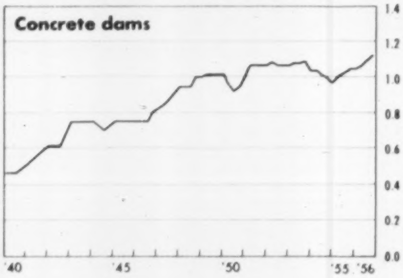


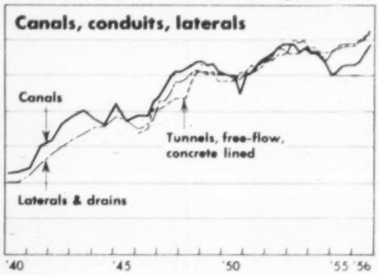












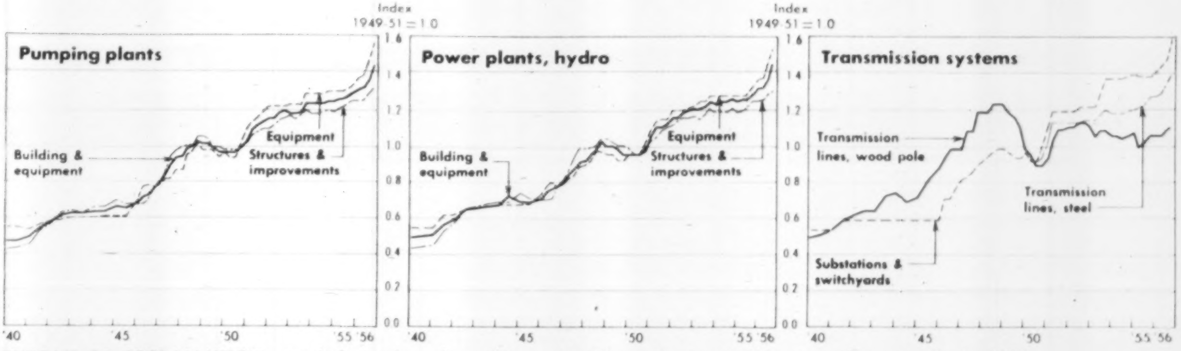
Irrigation and Hydro-power Construction Cost Indexes—1949–51 = 1.0

U S. Bureau of Reclamation Office of Assistant Commissioner and Chief Engineer, Denver, Colo.

Item	Class of Construction	Conv. fact*	1940		1941		1942		1943		1944		1945		1946		1947	
			Jan.	July	Jan.	July	Jan.	July	Jan.	July	Jan.	July	Jan.	July	Jan.	July	Jan.	July
	Composite index	**2.12**	**0.47**	**0.47**	**0.49**	**0.57**	**0.61**	**0.67**	**0.75**	**0.76**	**0.75**	**0.72**	**0.76**	**0.76**	**0.76**	**0.87**	**0.86**	**0.94**
a	Dams, earth	2.00	0.50	0.51	0.52	0.68	0.70	0.84	0.88	0.93	0.87	0.82	0.89	0.80	0.85	0.85	0.98	1.02
b	Dams, concrete	2.11	0.47	0.47	0.52	0.57	0.62	0.62	0.76	0.76	0.76	0.71	0.76	0.76	0.76	0.76	0.83	0.88
c	Pumping plants, bldg & equip	2.06	0.48	0.48	0.50	0.55	0.58	0.62	0.63	0.63	0.64	0.64	0.67	0.66	0.69	0.73	0.80	0.90
d	struct, reinf conc, & improv	2.31	0.43	0.44	0.46	0.53	0.57	0.63	0.64	0.63	0.66	0.66	0.70	0.68	0.68	0.70	0.80	0.95
e	equipment	1.81	0.55	0.55	0.54	0.56	0.58	0.59	0.60	0.60	0.60	0.61	0.61	0.61	0.70	0.78	0.78	0.82
f	pumps & prime equip	1.80																
g	access elec & misc equip	1.86																
h	discharge pipes	2.18														0.69	0.82	0.89
i	Canals	2.16	0.46	0.47	0.49	0.61	0.64	0.73	0.78	0.81	0.77	0.74	0.85	0.76	0.78	0.78	0.89	0.99
j	Conduits, tunnels, free flow, conc lined	2.26													0.68	0.71	0.82	0.86
k	Laterals and drains	2.42	0.41	0.41	0.45	0.51	0.56	0.60	0.64	0.67	0.71	0.72	0.77	0.76	0.70	0.74	0.86	0.91
l	Primary roads	2.08	0.48	0.48	0.53	0.58	0.67	0.77	0.86	0.82	0.82	0.77	0.77	0.77	0.82	0.82	0.82	0.91
m	Secondary roads, unsurf	1.98	0.50	0.50	0.55	0.61	0.71	0.86	0.96	0.96	0.91	0.91	0.86	0.86	0.86	0.91	0.88	0.98
n	Bridges, steel	2.18	0.46	0.46	0.50	0.55	0.60	0.69	0.71	0.69	0.73	0.73	0.73	0.69	0.76	0.78	0.87	0.96
o	Power plants, hydro, bldg & equip	1.98	0.50	0.51	0.52	0.57	0.60	0.65	0.66	0.67	0.68	0.73	0.70	0.69	0.71	0.77	0.80	0.88
p	structs, reinf conc, imprv	2.28	0.44	0.45	0.46	0.53	0.58	0.65	0.67	0.68	0.69	0.69	0.74	0.71	0.70	0.71	0.82	0.95
r	equipment	1.83	0.55	0.55	0.55	0.62	0.62	0.65	0.66	0.66	0.68	0.67	0.67	0.68	0.73	0.80	0.79	0.84
s	turbines & generators	1.80	0.56	0.56	0.56	0.64	0.67	0.67	0.68	0.68	0.70	0.69	0.69	0.69	0.76	0.83	0.81	0.83
t	acces elec equip	1.84	0.54	0.54	0.55	0.56	0.55	0.57	0.58	0.58	0.58	0.58	0.59	0.61	0.65	0.72	0.74	0.89
u	misc equip	1.95	0.51	0.51	0.53	0.55	0.58	0.65	0.65	0.67	0.68	0.71	0.70	0.71	0.70	0.73	0.76	0.81
v	penstocks	2.18														0.69	0.82	0.89
w	Transm switchyards & substa	2.03	0.54	0.54	0.54	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.70	0.81	0.86
x	Transm lines, wood pole 115kv	2.02	0.50	0.52	0.54	0.59	0.62	0.64	0.64	0.73	0.74	0.69	0.72	0.82	0.89	0.99	0.99	1.09
y	Transm lines, steel tower 230 kv	1.91																
z	Permanent genl property, bldgs	2.26	0.44	0.44	0.44	0.49	0.53	0.53	0.58	0.58	0.58	0.62	0.62	0.62	0.62	0.66	0.75	0.84

Item	Class of Construction	1950				1951				1952				1953				1954	
		Jan.	Apr.	July	Oct.	Jan.	Apr.	July	Oct.	Jan.	Apr.	July	Oct.	Jan.	Apr.	July	Oct.	Jan.	Apr.
	Composite Index	**1.02**	**0.98**	**0.95**	**0.94**	**1.01**	**1.05**	**1.07**	**1.07**	**1.10**	**1.11**	**1.12**	**1.13**	**1.13**	**1.14**	**1.16**	**1.17**	**1.13**	**1.13**
a	Dams, earth	1.05	1.00	0.92	0.88	0.98	1.05	1.05	1.05	1.05	1.08	1.10	1.10	1.09	1.10	1.10	1.12	1.09	1.09
b	Dams, concrete	1.02	0.97	0.93	0.95	1.02	1.07	1.07	1.07	1.07	1.09	1.07	1.07	1.07	1.08	1.08	1.09	1.04	1.04
c	Pumping plants, bldg & equip	0.97	0.97	0.97	1.00	1.04	1.09	1.12	1.14	1.16	1.16	1.19	1.20	1.18	1.18	1.19	1.24	1.24	1.24
d	struct. reinf conc, & improv	0.98	0.98	0.98	1.00	1.02	1.06	1.08	1.10	1.10	1.12	1.15	1.16	1.17	1.15	1.18	1.20	1.18	1.18
e	equipment	0.97	0.94	0.94	1.02	1.10	1.13	1.16	1.19	1.22	1.22	1.22	1.22	1.23	1.23	1.23	1.29	1.29	1.29
f	pumps & prime equip	0.97	0.94	0.94	1.00	1.08	1.14	1.17	1.17	1.22	1.22	1.22	1.22	1.28	1.28	1.28	1.34	1.34	1.34
g	access elec & misc equip	0.97	0.94	0.94	1.02	1.10	1.10	1.18	1.18	1.18	1.18	1.18	1.18	1.12	1.13	1.15	1.18	1.19	1.20
h	discharge pipes	0.94	0.96	0.96	1.03	1.08	1.12	1.15	1.15	1.17	1.17	1.19	1.21	1.21	1.21	1.25	1.31	1.30	1.30
i	Canals	1.01	1.00	1.00	0.90	1.00	1.02	1.06	1.09	1.11	1.13	1.16	1.18	1.18	1.18	1.14	1.16	1.13	1.13
j	Conduits, tunnels, free flow, conc lined	0.97	0.97	0.97	1.02	1.02	1.06	1.04	1.08	1.08	1.11	1.15	1.15	1.13	1.13	1.13	1.16	1.16	1.16
k	Laterals and drains	1.00	1.00	0.98	0.98	1.01	1.01	1.03	1.05	1.10	1.09	1.12	1.12	1.14	1.20	1.19	1.20	1.14	1.14
l	Primary roads	1.01	0.98	0.94	0.94	0.99	1.03	1.08	1.08	1.11	1.13	1.13	1.15	1.18	1.18	1.19	1.16	1.13	1.13
m	Secondary roads, unsurf	1.04	1.01	0.91	0.88	0.96	1.01	1.06	1.09	1.14	1.14	1.14	1.16	1.19	1.12	1.14	1.12	1.05	1.05
n	Bridges, steel	0.96	0.96	0.94	0.96	1.01	1.10	1.12	1.12	1.12	1.12	1.15	1.17	1.19	1.17	1.20	1.28	1.27	1.27
o	Power plants, hydro, bldg & equip	0.96	0.96	0.96	0.98	1.06	1.11	1.11	1.13	1.16	1.16	1.19	1.20	1.21	1.21	1.22	1.25	1.24	1.25
p	structs, reinf conc, imprv	0.99	0.96	0.96	0.99	1.03	1.05	1.09	1.10	1.12	1.14	1.16	1.16	1.17	1.15	1.18	1.21	1.19	1.19
r	equipment	0.96	0.96	0.96	1.01	1.09	1.14	1.15	1.15	1.20	1.20	1.20	1.21	1.23	1.25	1.25	1.28	1.28	1.28
s	turbines & generators	0.97	0.94	0.94	1.00	1.08	1.17	1.17	1.17	1.22	1.25	1.22	1.24	1.27	1.29	1.28	1.31	1.31	1.31
t	acces elec equip	0.92	0.92	0.95	1.01	1.14	1.14	1.14	1.14	1.20	1.20	1.20	1.21	1.15	1.16	1.18	1.21	1.22	1.23
u	misc equip	0.97	0.95	0.97	1.00	1.08	1.10	1.13	1.13	1.13	1.13	1.13	1.13	1.15	1.14	1.15	1.18	1.17	1.17
v	penstocks	0.94	0.96	0.96	1.03	1.08	1.12	1.15	1.15	1.17	1.17	1.19	1.21	1.21	1.21	1.25	1.31	1.30	1.30
w	Transm switchyards & substa	0.97	0.92	0.92	1.01	1.11	1.19	1.19	1.19	1.19	1.19	1.22	1.22	1.22	1.22	1.31	1.37	1.37	1.37
x	Transm lines, wood pole 115 kv	0.99	0.96	0.89	0.89	0.94	1.04	1.09	1.09	1.11	1.11	1.13	1.13	1.11	1.06	1.09	1.09	1.06	1.06
y	Transm lines, steel tower 230 kv			0.92	0.94	1.02	1.13	1.13	1.13	1.13	1.13	1.13	1.14	1.14	1.14	1.18	1.20	1.18	1.18
z	Permanent genl property, bldgs	0.93	0.93	0.95	1.06	1.11	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.14	1.14	1.14	1.17	1.15	1.15

* Multiplier to convert to 1940 = 1.0 base
Based on combined costs of material and labor furnished by the contractor, and material and labor furnished by the government on B of R projects in 17 western states and Alaska



BUREAU OF RECLAMATION cost indexes show how the construction cost rise of 1955 stepped up rapidly in 1956

Reclamation Indexes

Bureau of Reclamation cost indexes measure trends for 26 types of work. The composite index includes a concrete dam, power generating plant, power transmission system, earth dam, canals, laterals, and drains.

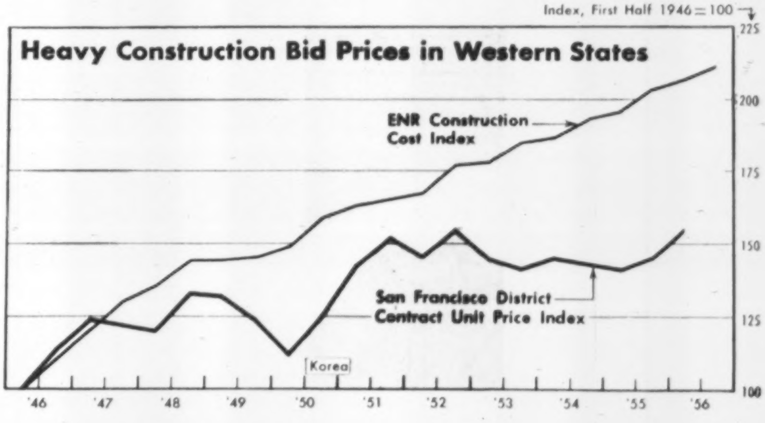
1948 Jan.	1948 Apr.	1948 July	1948 Oct.	1949 Jan.	1949 Apr.	1949 July	1949 Oct.	Item
0.99	**0.99**	**1.01**	**1.05**	**1.04**	**1.04**	**1.04**	**1.02**	
1.05	1.05	1.08	1.12	1.12	1.10	1.08	1.05	a
0.95	0.95	0.95	1.00	1.00	1.02	1.02	1.02	b
0.95	0.99	1.01	1.04	1.02	1.02	1.00	0.97	c
1.00	1.01	1.01	1.06	1.06	1.04	1.00	1.00	d
0.87	0.95	0.97	1.02	0.98	0.98	0.97	0.94	e
			1.03	0.94	0.97	0.97	0.94	f
			1.08	1.05	0.99	0.97	0.97	g
0.92	0.96	1.03	1.10	1.10	1.06	0.96	0.94	h
1.02	1.04	1.06	1.08	1.08	1.06	1.07	1.02	i
0.88	0.88	0.97	1.02	1.02	1.02	1.02	0.97	j
0.97	0.98	1.01	1.03	1.02	1.01	1.02	1.01	k
0.96	0.98	1.01	1.06	1.06	1.06	1.06	1.06	l
1.04	1.06	1.11	1.14	1.14	1.11	1.08	1.08	m
1.01	1.01	1.01	1.06	1.06	1.03	1.03	1.01	n
0.93	0.96	0.99	1.04	1.01	1.01	0.99	0.96	o
0.99	1.00	1.01	1.05	1.05	1.03	1.01	1.01	p
0.90	0.92	0.98	0.98	0.96	0.96	0.93	0.93	r
0.89	0.92	0.98	1.00	0.97	0.97	0.94	0.94	s
0.99	1.01	1.02	1.03	1.01	1.01	0.98	0.92	t
0.89	0.92	1.02	1.08	1.05	1.05	0.98	0.95	u
0.92	0.96	1.03	1.10	1.10	1.06	0.96	0.94	v
0.92	0.94	0.97	0.99	0.99	0.97	0.94	0.94	w
1.19	1.19	1.24	1.24	1.24	1.19	1.16	1.11	x
								y
0.91	0.91	0.95	0.95	0.95	0.93	0.93	0.93	z

1954 Jul.	1954 Oct.	1955 Jan.	1955 Apr.	1955 July	1955 Oct.	1956 Jan.	1956 Apr.	1956 July	1956 Oct.	Item
1.11	**1.09**	**1.07**	**1.09**	**1.11**	**1.14**	**1.15**	**1.16**	**1.19**	**1.24**	a
1.06	1.03	0.98	1.03	1.05	1.07	1.07	1.08	1.13	1.17	b
1.02	1.00	0.97	1.00	1.02	1.04	1.04	1.06	1.09	1.12	c
1.24	1.25	1.25	1.26	1.26	1.29	1.31	1.33	1.37	1.43	d
1.19	1.20	1.19	1.21	1.22	1.24	1.24	1.25	1.28	1.31	e
1.29	1.30	1.30	1.30	1.30	1.33	1.38	1.39	1.45	1.56	f
1.35	1.35	1.35	1.35	1.35	1.38	1.44	1.46	1.54	1.64	g
1.20	1.20	1.20	1.20	1.20	1.23	1.25	1.26	1.30	1.41	h
1.28	1.30	1.32	1.34	1.36	1.46	1.47	1.50	1.53	1.66	i
1.11	1.08	1.00	1.02	1.05	1.06	1.06	1.08	1.13	1.18	j
1.13	1.13	1.14	1.15	1.16	1.17	1.17	1.19	1.23	1.24	k
1.12	1.09	1.15	1.16	1.18	1.18	1.18	1.19	1.20	1.26	l
1.11	1.10	1.11	1.11	1.12	1.12	1.12	1.14	1.16	1.19	m
1.03	1.02	1.03	1.03	1.04	1.04	1.04	1.07	1.08	1.11	n
1.27	1.30	1.30	1.30	1.32	1.35	1.36	1.38	1.40	1.47	o
1.25	1.26	1.25	1.26	1.26	1.28	1.31	1.32	1.37	1.44	p
1.19	1.21	1.19	1.20	1.22	1.24	1.24	1.25	1.28	1.30	q
1.28	1.28	1.28	1.28	1.28	1.31	1.36	1.37	1.44	1.53	r
1.32	1.32	1.31	1.31	1.31	1.33	1.39	1.39	1.46	1.57	s
1.23	1.23	1.24	1.24	1.24	1.26	1.29	1.30	1.34	1.44	t
1.17	1.19	1.20	1.21	1.23	1.26	1.29	1.31	1.34	1.43	u
1.28	1.30	1.32	1.34	1.36	1.46	1.47	1.50	1.53	1.66	v
1.37	1.38	1.39	1.38	1.38	1.38	1.41	1.43	1.47	1.59	w
1.05	1.06	1.08	1.00	1.02	1.06	1.06	1.06	1.09	1.11	x
1.18	1.19	1.20	1.21	1.22	1.27	1.28	1.29	1.33	1.39	y
1.15	1.17	1.18	1.18	1.20	1.25	1.25	1.26	1.29	1.30	z

Bids Prices in Western States

Bid prices have increased 9.5% since the first half of 1955 and in the first half of '56 were very close to the record high in late 1953. Evidence of this trend in the western states comes from the index compiled by the Estimate Section, San Francisco District, Corps of Engineers, U. S. Army, based on the average of three low bids on all significant projects for which unit prices were reported in "Daily Construction Service."

The index, its components, and their weights are shown here.



Contract Unit Price Index—Western States

Estimates Section, San Francisco District, Corps of Engineers, U. S. Army—1st half 1946 = 100

		1946 1st half	1949 1st half	1949 2nd half	1950 1st half	1950 2nd half	1953 1st half	1953 2nd half	1954 1st half	1954 2nd half	1955 1st half	1955 2nd half	1956 1st half
Index, 1st Hf '46 = 100		100.0	132.2	124.3	111.9	126.08	145.35	140.50	145.09	142.83	141.37	145.36	154.74
Items used in index	Unit	Based on these average unit prices											
Cr rock base course	ton	2.81	2.29	2.41	2.37	2.20	2.80	3.03	2.96	2.92	3.03	2.90	3.48
Plant mix aggregate	ton	4.82	4.43	4.35	3.75	4.68	5.99	5.16	5.84	5.43	5.86	6.04	6.19
Plant mix asphalt	ton	22.00	26.85	22.20	18.98	23.00	24.00	26.00	21.46	26.00	25.00	19.63	21.74
Cover aggregate	ton	5.09	5.65	5.50	5.22	5.07	6.37	6.44	6.42	6.39	6.63	6.71	6.60
Structural concrete	cy	50.65	65.07	59.20	54.11	58.00	71.00	72.00	67.71	70.41	67.00	74.00	72.00
Pavement concrete	cy	13.20	19.69	24.83	18.50	20.00	19.00	19.00	19.09	21.55	22.00	23.00	24.00
Reinforcing steel	cwt	9.60	12.70	11.40	11.00	13.40	13.70	14.00	14.00	14.00	13.00	13.00	13.00
Cement	bbl	2.84	4.98	4.52	4.24	4.75	4.83	4.91	4.63	4.52	4.68	4.76	5.04
CM pipe 12"	lf	2.20	3.03	2.88	2.75	3.00	3.61	3.78	3.70	3.67	3.60	3.72	3.98
CM pipe 24"	lf	4.05	5.26	4.88	4.82	5.23	6.46	6.75	6.33	6.55	6.84	6.66	6.60
RC pipe 18"	lf	3.50	4.27	4.55	4.54	5.08	6.25	5.51	5.10	5.37	5.15	5.37	5.91
RC pipe 36"	lf	8.29	10.47	10.70	9.48	10.26	13.94	12.66	11.24	11.66	11.62	11.23	11.86
VC pipe 6"	lf	1.87	2.39	2.29	2.00	2.44	3.01	2.87	2.80	2.98	2.75	3.38	3.50
VC pipe 8"	lf	2.22	2.80	2.81	2.82	2.60	3.53	3.46	3.40	3.83	3.36	3.71	3.99
Sewer manhole	1/10 ea	16.50	20.80	19.20	17.80	21.20	25.34	17.60	23.67	23.33	23.70	23.00	24.90
Roadway excavation	cy	0.67	.96	.90	.64	.78	1.07	1.15	.87	.90	.80	.95	.92
Structural excavation	cy	2.49	4.27	3.26	3.14	3.76	3.57	4.26	3.72	3.96	3.78	3.48	3.63
Watering	M gal	2.13	2.13	1.75	1.66	1.84	2.14	2.07	1.74	1.70	1.71	1.69	1.76
Flat wheel roller	R-hr	5.47	7.82	6.86	7.79	6.92	8.00	9.36	9.86	7.05	8.50	7.74	8.15
Piling, gr wood, fur	lf	0.64	0.65	0.58	0.64	0.88	1.01	1.38	1.48	1.31	1.17	1.20	1.35
Piling, treated, fur	lf	1.25	1.45	1.45	1.20	1.53	1.77	1.74	1.64	2.01	1.84	1.75	2.00
Timber in place	100 fbm	16.60	26.33	25.34	21.20	27.70	30.80	28.00	42.20	27.59	32.10	36.70	45.20
2" Galv steel pipe	lf	1.04	1.38	1.18	1.24	1.33	1.68	1.45	1.62	1.62	1.65	1.74	1.60
Cast-iron pipe 6"	lf	2.86	4.17	3.93	3.50	3.86	4.15	4.53	4.15	4.34	4.36	3.94	4.54
Cast-iron pipe 8"	lf	3.80	6.47	5.01	5.35	5.66	5.66	5.68	5.04	6.71	4.80	4.79	5.23
Gate valve 6"	1/10 ea	7.06	9.70	8.80	8.00	9.00	11.80	9.30	10.30	10.20	8.85	10.40	12.50
Total in dollars		193.65	256.01	240.78	216.74	244.17	281.48	272.09	280.97	276.60	273.78	281.49	299.67

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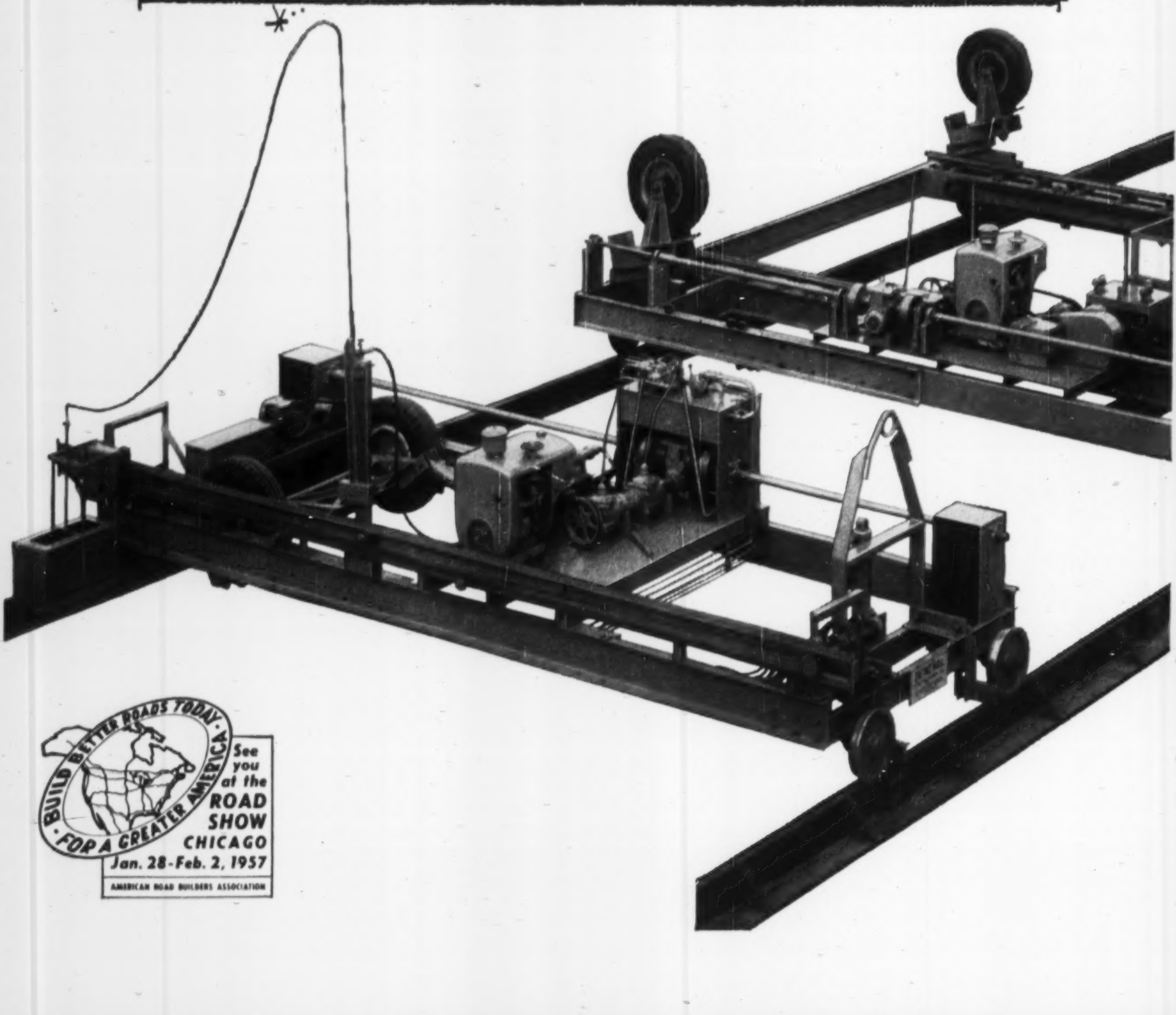

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Fully Automatic System • One-man operation . . . electrically controlled . . . interlocked batching.

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_____ Have representative call.

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Company ____________________
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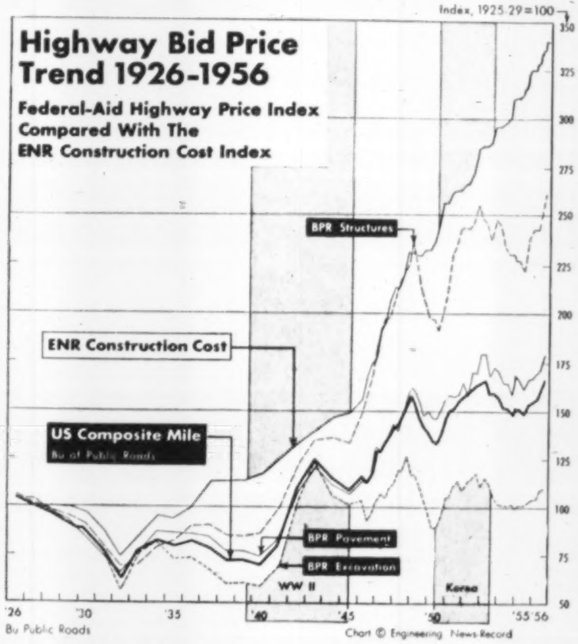

Composite Standard Mile Highway Price Index

U. S. Bureau of Public Roads, 1925-29 = 100

Year	Excavation[1] 17,491 cy* Bid Price[3]	Excavation[1] 17,491 cy* Sub-index	Surfacing[2] 3,726 sy* Bid price[3]	Surfacing[2] 3,726 sy* Sub-index	Structures: Reinf. steel 16,000* lb. Bid price[3]	Structures: Struct. steel 4,325* lb. Bid price[3]	Structures: Struct. concr. 68* cy Bid price[3]	Structures: Comb. Sub-index	Composite Mile index
'25-'29 = 100	$0.35†	100.0	$2.22†	100.0	$0.062†	$0.067†	$22.15†	100.0	100.0
1926	.36	103.7	2.29	103.1	.053	.074	22.76	103.7	103.4
1930	.30	86.3	1.86	84.1	.045	.061	20.08	89.4	85.7
1932	.18	55.0	1.44	64.8	.034	.046	15.33	68.0	61.0
1939	.21	59.8	1.73	77.8	.044	.059	19.13	85.9	72.6
1940	.21	59.2	1.68	75.6	.045	.063	19.17	87.6	71.6
1941	.24	69.2	1.87	84.1	.054	.076	21.44	100.8	81.4
1942	.37	104.1	2.39	107.9	.065	.090	26.16	122.3	108.8
1943	.44	124.0	2.71	122.3	.067	.095	30.19	134.4	124.9
1944	.37	106.6	2.45	110.6	.064	.089	31.94	136.5	113.1
1945	.36	101.6	2.38	107.4	.062	.077	31.62	132.5	109.0
1946	.35	99.1	2.65	119.3	.075	.113	38.79	164.7	119.0
1947	.38	108.4	3.01	135.5	.093	.132	45.84	196.9	135.0
1948	.42	119.3	3.37	151.9	.108	.158	51.00	223.9	151.2
1949	.38	107.4	3.40	153.1	.104	.146	47.36	210.3	145.8
1950	.33	94.5	3.32	149.8	.100	.139	44.62	199.4	137.7
1951:	**.39**	**110.0**	**3.54**	**159.5**	**.120**	**.180**	**52.07**	**237.8**	**153.7**
Q1	.37	106.3	3.51	158.3	.116	.180	50.12	230.4	150.6
Q2	.39	111.4	3.48	156.9	.119	.170	51.45	234.0	152.4
Q3	.40	113.7	3.51	158.3	.122	.182	53.21	242.5	155.1
Q4	.38	108.5	3.65	164.6	.123	.187	53.51	244.3	156.7
1952:	**.40**	**114.2**	**3.80**	**171.3**	**.124**	**.186**	**54.50**	**247.8**	**162.5**
Q1	.40	112.8	3.71	158.3	.123	.184	52.97	242.5	159.3
Q2	.41	115.4	3.78	170.4	.122	.175	54.80	245.5	162.1
Q3	.41	117.9	3.74	168.6	.126	.195	56.55	255.4	163.6
Q4	.39	110.5	3.97	179.0	.126	.191	53.69	247.7	164.9
1953:	**.38**	**108.6**	**3.82**	**172.0**	**.122**	**.186**	**53.53**	**243.8**	**160.2**
Q1	.40	114.8	3.96	178.5	.121	.192	53.91	245.4	165.9
Q2	.39	112.0	3.73	168.2	.120	.180	51.67	237.1	158.5
Q3	.37	105.1	3.81	171.8	.123	.196	54.07	247.6	159.4
Q4	.36	102.3	3.76	169.5	.123	.175	54.48	245.0	156.9
1954:	**.35**	**100.9**	**3.63**	**163.6**	**.116**	**.167**	**50.91**	**229.9**	**151.2**
Q1	.36	101.4	3.63	163.7	.115	.174	52.00	233.9	152.0
Q2	.35	100.9	3.63	163.7	.115	.167	50.61	229.1	151.1
Q3	.36	101.4	3.53	159.2	.117	.167	50.64	229.9	149.2
Q4	.35	100.0	3.72	167.7	.115	.158	50.40	226.8	152.4
1955:	**.36**	**101.9**	**3.67**	**165.3**	**.116**	**.165**	**51.99**	**232.8**	**152.8**
Q1	.36	101.1	3.67	165.5	.113	.157	51.14	227.3	151.8
Q2	.35	100.3	3.60	162.3	.112	.152	50.09	223.3	149.4
Q3	.36	102.3	3.68	165.9	.118	.166	53.47	237.6	154.0
Q4	.36	103.7	3.71	167.3	.122	.187	53.26	243.0	156.0
1956:									
Q1	.37	104.8	3.76	169.5	.124	.192	52.42	243.1	157.5
Q2	.38	108.3	3.82	172.2	.128	.197	53.55	249.5	161.1
Q3	.39	109.7	4.00	180.3	.134	.205	55.81	260.5	167.2

*[1] Common excav. plus other excav. Items expressed as equivalent common excav.
*[2] Portland-cmt. concr. plus other surfacing expressed as equivalent portland-cmt. concr.
*[3] Calculated to one more decimal place than shown in this table. ** Fixed quantities used for establishing composite mile for price trend. *† Prices used for establishing composite mile index bases.

Highway Bid Prices Up

Contractors across the country raised their bid prices on new highway projects this year more than enough to allow for higher costs of materials, labor and equipment. With the ENR Construction Cost Index up 4.5%, highway bid prices are up 8.6% on the average.

The new conditions that contribute to this price rise include more work to bid on, higher cost of borrowing working capital, an 8½% rise in equipment prices, 10% for tractors and an 8% rise in steel prices. But materials on the average are up 4% while wages are not quite 5% higher.

However, contractors this year are bidding into almost certain future price increases for steel, cement and equipment and into built-in wage increases in existing labor contracts. But mainly they have been, and still are, bidding under clouds of uncertainty because of acute shortages and long waits for construction steel.

The effects of substantial steel price increases on highway bid prices shows up clearly in the Bureau of Public Roads Composite Mile Bid Price Index for federal-aid highway projects. Between the third quarter of 1955 and the third quarter of 1956, this index rose 8.6%. But its structural steel component rocketed by 23.5% over this same period, while the reinforcing steel sub-index soared 13.6%. Average bid prices on the other elements which make up the BPR Composite Index also rose: common excavation, 7.2%; and Portland cement concrete pavement, 8.7%.

• **In individual states** more sensational increases have come in bid price indexes. The indexes of six western states climbed by 10%-28% between the third quarter of '55 and the same quarter of '56. Oregon's index shot up 28%; Washington's by 19.6%; California's by 19.4%; South Dakota's by 11.9%; and Texas' and Colorado's by 10%.

Montana shows a whopping 35.4% rise for the first nine months of '56 compared with the 1955 period. Virginia has a 15.3% increase for the first nine months.

Among those states who report an index for the first half of '56, Connecticut shows a 15.6% rise over the first half of '55, while Minnesota has a 14.2% increase.

By contrast, highway bid prices have been relatively stable in Arkansas and in Oklahoma. Idaho bucked the general trend with a 5.8% decline, making it the only state where the latest bid price index is below the year-ago value.

The historical record and latest values of state highway price indexes are tabulated on page 111. Charts on the following pages show the bid price trend since 1949, while tables show the trend in average unit prices for items used by states to compute their price indexes.

Colorado, Unit Prices Used in Contract Price Index

Item	Unit	Quantity	Unit Price 1949	Unit Price 1952	Unit Price 1953	Unit Price 1954	Unit Price 1955	3rd Q 1956
Excavation, unclass	cy	10,630	$0.441	$0.374	$0.290	$0.277	$0.261	$0.482
struct	cy	109	3.376	3.983	2.645	2.045	**	**
Backfill, struct	cy	116	1.948	1.888	1.654	1.443	**	**
Rolling	hr	88	7.470	9.174	8.973	8.843	**	**
Wetting	Mgal	351	1.382	1.261	1.095	1.123	**	**
Overhaul	stay	64,112	0.014	0.012	0.009	0.008	0.007	0.111
	ydmi	6,065	0.122	0.110	0.097	0.099	0.102	0.106
	tnmi	12,188	0.091	0.111	0.082	0.073	0.071	0.077
Sub-base	t	2,998*	0.521	0.589	0.542	0.376	0.343	0.375
Gravel, cr rock surf	t	1,976	0.894	1.094	0.939	0.746	0.766	0.865
Asphalt	t	17	37.500	36.928	27.868	26.236	**	**
liquid	gal	10,262	0.151	0.162	0.152	0.148	0.159	0.189
Road mix process	sy	4,669	0.097	0.090	0.089	0.082	**	**
Stone screenings	t	70	3.727	6.299	5.809	5.106	**	**
Asph surf, plant mix	t	279	4.500	4.624	3.434	3.315	3.163	3.322
Concrete pavement	sy	449	3.512	3.473	3.432	3.858	3.646	3.250
Bridge timber	Mfbm	1	236.378	309.120	268.521	263.387	**	**
Concrete	cy	36	48.564	53.777	53.539	48.721	51.251	55.641
Steel, reinf	lb	4,107	0.115	0.067	0.083	0.111	**	**
struct	lb	7,114	0.133	0.114	0.095	0.142	0.145	0.187
Culvert, RCCP	lf	16♯	8.263	7.078	6.392	6.303	**	**
CMP	lf	109♯	5.823	7.335	7.501	7.366	6.955	8.506
Fence, barbed wire	lf	1,286	0.220	0.239	0.232	0.222	**	**
Sewer pipe	lf	17♯	7.504	5.898	6.655	7.498	**	**

* incl all matl whether bid as sub-base or select borrow ♯ incl all diam priced at average of all pipe used † estimated ** Item not included in index beginning with third quarter of 1955

Hydrocrane Cleans Up the Bottleneck Jobs on Street Repair and Highway Construction

A fast-traveling, smooth-working Bucyrus-Erie Hydrocrane can turn in top profits while handling dozens of digging, lifting, moving, materials handling and clean-up assignments on street repair and highway construction jobs. Equipped with clamshell, it digs manholes, hydrant pits, water, sewer, gas line trench. It loads trucks, handles special digging jobs around bridges and overpasses. Put on a crane hook and you can pull sheeting, handle concrete forms, shoring, timber, as well as lift parts for hooking up other equipment.

With smooth, proved hydraulic power, the Hydrocrane has precision control that ordinary equipment can't match. Telescoping boom permits moving equipment and supplies in and out of close quarters, over and under obstructions without moving the crane an inch. Sturdy outriggers set or retract at the touch of a lever . . . let you set up or get away fast. Highway speeds of up to 50 mph let you get to emergency spots in a hurry — clean up a job — move right on to another trouble spot.

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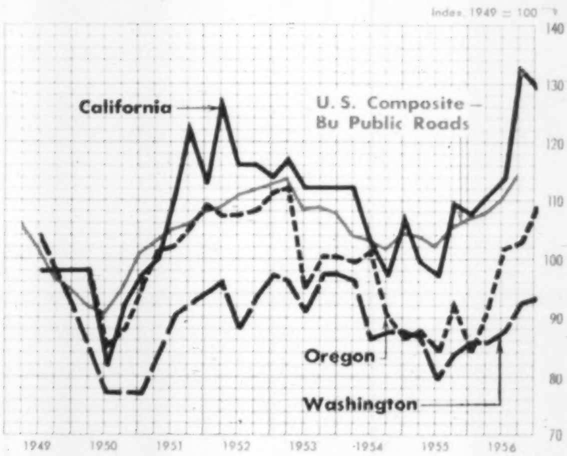

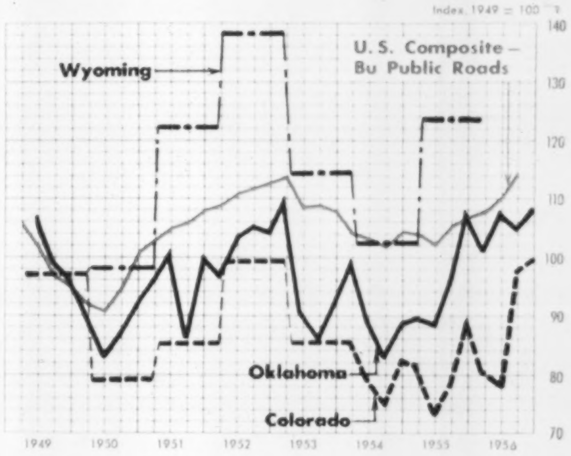

State Highway Bid Price Indexes—1937-Date

Reported by State Highway Departments to Engineering News-Record

State	California		Oregon	Washington	Idaho	Montana	New Mexico	Texas	Oklahoma	Colorado	Wyoming	Nebraska	South Dakota	Arkansas	Mississippi	Minnesota	Michigan	Virginia	Pennsylvania	Connecticut
	Bridges	Highway																		
Base year	'39-'40	1940	1940	1940	1950	'40-'41	'38-'41	'49-'53	1940	1949	1940	'32-'41	1940	1940	'37-'41	1940	1940	'37-'41	1940	1939
1937	114											106.2	112.4		102.7			95.2		
1938	99						100.7					99.1	95.5		95.8			100.4		
1939	101						85.3					97.5	90.0		101.3		94.5	96.1		100.0
1940	99	100.0	100.0	100.0		100.0	101.2				100	93.2	100.0	100	100.4	100.0	100.0	95.8	100	93.9
'41	122	125.0	115.9	126.7		100.0	113.0				126	103.3	107.9	129	117.1	101.5	112.0	112.5	111	116.7
'42	158	157.5	156.8	174.5		125.5	169.1				178	171.4	159.8	181	158.8	145.1	138.0	149.1	138	141.1
'43	165	156.4	158.0	181.2		125.5	193.8				166	152.7	197.9	187	173.7	130.2	152.0	172.4	157	n.a.
'44	153	177.8	166.4	177.7		125.5	144.0				203	157.0	138.5	199	196.1	131.8	155.5	167.2	133	n.a.
'45	167	179.5	145.5	163.9		121.7	187.4				201	181.0	202.7	200	234.9	132.2	154.3	176.9	167	151.5
1946 Q 1.	156																			
2.	190																			
3.	224																			
4.	217																			
'46.		179.7	155.9	163.0		149.6	180.1				186	162.4	177.6	205	163.4	147.1	155.8	198.9	171	170.1
1947 Q 1.	224																			
2.	216																			
3.	219																			
4.	223																			
'47.		203.3	185.1	194.6		167.5	186.6				197	188.6	212.2	241	187.9	169.0	151.5	205.1	201	186.4
1948 Q 1.	220																			
2.	225															H1 196.9				
3.	238																			
4.	231															H2 193.7				
'48.		216.6	198.6	200.4		191.6	178.7				200	222.3	230.5	249	197.1	195.6	162.0	234.5	208	211.8
1949 Q 1.	207							92.4	M 198.1											
2.	210			H1 226.9				89.0	J 184.7							H1 166.3				
3.	191							88.3	S 178.7											
4.	187			H2 202.0				88.7	D 168.9							H2 n.a.				
'49.		190.7	181.1			180.7	179.2	89.8	180.7	100.0	167	207.1	217.0	236	182.7	160.0	149.0	203.6	193	184.6
1950 Q 1.	177	160.6	157.6					87.8	M 155.6				177.8							
2.	195	180.0	162.2	H1 168.6				89.9	J 161.8				167.5			H1 147.5				H1 170.8
3.	212	189.2	175.8					101.6	S 171.0				179.5							
4.	218	194.8	187.4	H2 169.8				106.2	D 179.7				206.8			H2 154.0				H2 185.0
'50.		176.7			100.0	180.0	210.5	97.3	166.5	82.2	169	191.3	176.3	229	175.5	148.5	151.5	190.8	192	
1951 Q 1.	243	215.4	187.7		99.9			103.0	M 187.5				189.3							
2.	250	238.3	193.6	H1 198.0	114.6			108.6	J 163.0				254.6			H1 180.5				H1 213.1
3.	256	221.9	201.0	205.4	106.5			105.9	S 185.5				217.0							
4.	253	245.4	196.6	209.8	119.9			97.9	D 180.9				268.0			H2 197.8				H2 223.7
'51.		210.8				192.4	206.1	104.0	182.0	87.7	209	223.7	229.4	279	206.5	185.3	173.0	247.1	216	
1952 Q 1.	239	224.8	197.0	192.7	93.9			100.5	M 191.9				233.9							
2.	236	224.4	199.5	204.3	94.2			104.7	J 195.4				216.6			H1 207.1				H1 231.9
3.	239	221.2	205.4	211.4	93.8			109.4	S 193.6				204.0							
4.	223	226.2	207.2	209.6	106.0			110.1	D 204.0				206.5			H2 202.2				H2 221.5
'52.		224.5				187.3	248.7	105.6	192.3	101.5	236	231.6	212.6	313	227.4	203.0	177.0	258.4	205	
1953 Q 1.	243	218.3	176.3	199.8	104.9			110.0	M 167.2				227.1							
2.	224	217.5	184.2	211.7	126.6			105.4	J 160.8				210.0			H1 180.0				H1 221.2
3.	231	218.0	184.1	212.2	108.5			97.1	S 172.2				186.4							
4.	235	216.7	183.4	209.6	116.9			98.4	D 184.2				206.8			H2 170.7				H2 216.7
'53.		216.2				169.0	246.9	102.7	168.6	87.7	196	223.8	197.1	267	186.8	175.8	178.6	226.2	209	
1954 Q 1.	221	199.4	186.0	188.8	110.2			96.6	165.9	82.5			166.9							
2.	217	189.0	167.2	190.0	107.5			98.8	156.0	78.7			169.5			H1 172.2				H1 221.8
3.	220	207.8	160.1	190.6	92.8			95.6	165.2	86.0			168.6							
4.	213	192.2	160.5	189.7	73.2			95.9	167.1	85.4			166.7			H2 178.4				H2 224.0
'54.		193.5				162.4	214.6	96.3	165.2	82.8	175	204.4	168.6	210	195.0	174.9	168.0	203.8	208	
1955 Q 1.	217	189.3	156.1	173.0	104.6	157.3		94.7	163.9	76.4			154.9							
2.	237	212.4	170.0	183.0	110.1	163.8*		99.0	178.1	81.4			172.8			H1 182.0				H1 n.a.
3.	229	208.6	155.2	187.0	120.0	170.7*		97.5	198.2	92.3			189.4							
4.	237	212.6	168.0	186.0	118.6	176.3*		98.6	187.6	82.8			189.8			H2 194.6				H2 234.5
'55.		203.8				176.3	217.1	97.0	185.7	81.4	210	212.2	177.0	224	180.7	188.8	181.9	223.4	199	
1956 Q 1.	245	219.5	186.6	190.0	124.0	222.9		100.6	198.92	80.5			189.6							
2.	284	255.9	188.5	221.4	104.4	215.8*		102.6	194.2	100.4		H1 231.6	220.0	H1 224		H1 207.8				H1 271.0
3.	260	249.1	198.6	223.7	113.0	231.2*		107.4	199.4	101.9			212.0					257.6*		

*Cumulative average for year to date.

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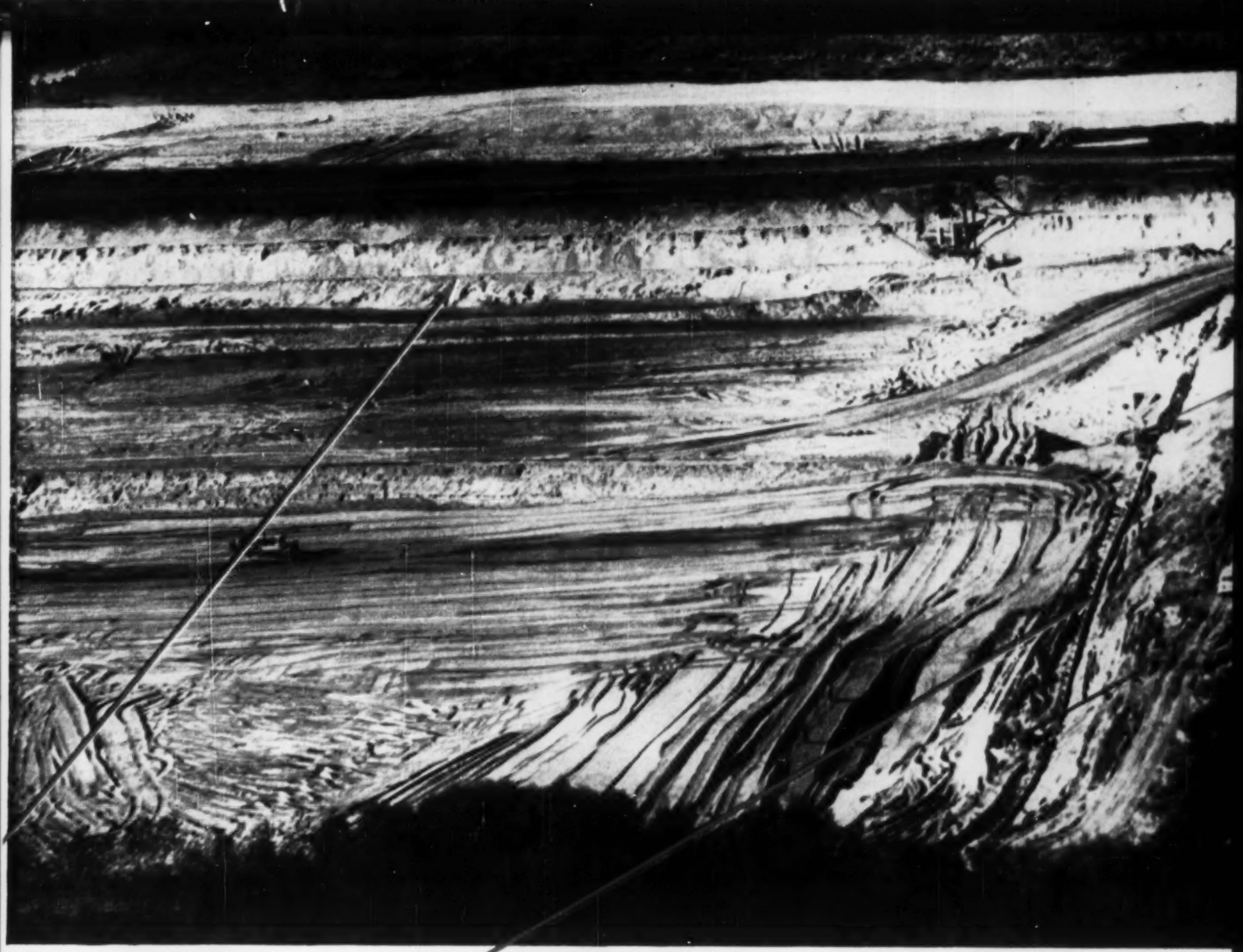

Borrow Pit "C", Winona, Minnesota. Johnson Construction Co., Grove City.

From the site shown here, a 22-acre borrow pit, the contractor removed 1,000,000 cubic yards of material in 60 days. Wellpoint sytsems installed by us (shown by arrows) kept 27 feet of water out of sight—out of trouble—off the contractor's mind.

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Clifty Creek Power Plant,
Madison, Ind.
Ohio Valley Electric Corporation
Sargents, Ohio

Industrial Canal Slips #5 and #6,
New Orleans, La.
Monroe Wolfe, New Orleans.

Power Plant,
Venice, Ill.
Stone and Webster Engr. Corp.,
New York.

Steam Plant,
Gulfport, Miss.
Mississippi Power Co., Gulfport.

Raritan Copper Works,
Building #4, Perth Amboy, N. J.
Wallace J. Wilck, Perth Amboy.

Dry Docks,
Wilmington, N. C.,
Tidewater Construction Corp., Norfolk, Va.

Stage IV, Oahe Earthwork Project,
Pierre, S. D., Western Contg. Corp.
Sioux City, Iowa.

Sanitary Sewer,
Texas City, Texas.
Mainland Const. Co., Texas City.

Soil Stabilization,
Norfolk, Va.
Norfolk & Western R.R., Norfolk.

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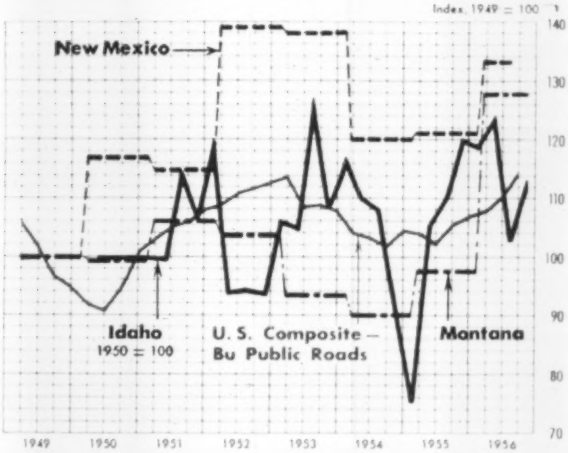


• **The California Division of Highways** construction price index is based on average contract prices for the eight principal classes of construction shown in the accompanying table. The index is weighted each year according to actual quantities of each of these contract items. (The base is 1940 = 100, 1940 quantities multiplied by 1940 average prices.)

• **Idaho** bases its composite highway price index on average prices on nine items, which are shown in the table below. Changing physical characteristic of individual highway jobs have contributed to the sharp ups and downs in this state's highway bid price index, shown in the chart above.

Idaho, Average Contract Unit Prices and Index

Year	Excav uncl $/cy	Sprinkling $/Mgal	Rolling $/hr	Crush surf $/t	Asph all gr $/gal	Road-Mix $/mi	Plant Mix $/t	Conc. Cl A $/cy	Reinf. steel $/lb	Comp. Index 50 = 100
50.	$0.618	$1.11	$4.06	$0.95	$0.129	$2,592.42	$1.92	$54.17	$0.112	100 0
51 Q 1.	0.586	0.85	4.56	0.95	0.130	1,858.76	3.30	54.69	0.123	99 9
Q 2.	0.536	1.09	4.09	1.03	0.139	2,954.16	3.90	50.18	0.115	114 6
Q 3.	0.522	1.30	4.93	1.17	0.142	2,600.32	3.24	60.00	0.160	106 5
Q 4.	0.656	1.46	5.02	1.22	0.145	2,259.81	3.90			119 9
52 Q 1.	0.407	1.02	3.77	1.07	0.156	2,938.07		56.02	0.150	93 9
Q 2.	0.495	0.99	4.64	1.15	0.139	2,983.59	4.04	66.10	0.129	94 2
Q 3.	0.345	1.08	4.79	1.00	0.152	1,903.47	2.84	58.44	0.127	93 8
Q 4.	0.613	1.15	4.67	0.90	0.155		5.43	66.95	0.138	106 0
53 Q 1.	0.506	1.22	4.22	1.00	0.144	2,977.37	4.56	64.71	0.134	104 9
Q 2.	0.574	1.70	5.00	1.26	0.147	4,214.41		69.73	0.152	126 6
Q 3.	0.410	1.31	3.85	0.90	0.160	2,985.71	3.45	63.41	0.136	108 5
Q 4.	0.553	1.16	3.76	1.17	0.189	3,835.49	3.80	61.39	0.126	116 9
54 Q 1.	0.448	0.57	3.83	0.80	0.154	1,340.60	3.92	51.17	0.146	110 2
Q 2.	0.426	1.31	4.86	1.26	0.124	2,047.42	2.91	58.97	0.111	107 5
Q 3.	0.296	0.96	4.15	0.96	0.150	3,192.20	2.84	59.90	0.119	92 8
Q 4.	0.342	0.54	3.31	0.64	0.135	2,166.80	2.00	56.45	0.122	73 2
55 Q 1.	0.333	1.33	4.76	0.932	0.163	2,686.12	3.85	72.25	0.1413	104 6
Q 2.	0.612	0.955	4.57	0.989	0.156	3,309.92	3.47	63.67	0.14	110 1
Q 3.	0.601	1.19	5.92	0.886	0.159	3,420.96	4.07	58.97	0.1204	120 0
Q 4.	0.55	1.26	5.69	1.45	0.168	2,856.06	2.47	55.97	0.126	118 6
[56 Q 1.	0.85	1.32	6.18	1.08	0.20	*7,859.00		60.54	0.123	124 0
Q 2.	0.44	1.42	3.81	1.07	0.158	2,983.20	3.36	70.70	0.138	104 4
Q 3.	0.477	0.88	5.33	1.164	0.183	3.232.00	*12.00	83.79	0.151	113 0

*Not used, distorted account, small quantity and not average condition

Wyoming, Average Unit Prices and Index

Weight Year	Excav common 39% $/cy	Grav base* 29% $/cy	Oil 9% ¢/gal	Conc Cl A 11% $/cy	Struct steel 6% $/lb	Timber treated piling 6% $/lf	Comp. Index 40 = 100
1940	$0 125	$0 670	$0 067	$18 15	$0 067	$1 25	100
1941	0 156	0 913	0 084	22 35	0 087	1 238	126
1942	0 271	1 136	0 094	25 00	0 091	1 599	178
1943	0 240	1 074	0 091	24 26	0 095	1 908	166
1944	0 327	1 122	0 087	36 59	0 099	2 047	203
1945	0 331	1 204	0 087	30 72	0 102	1 250	201
1946	0 250	1 263	0 093	33 61	0 108	2 105	186
1947	0 284	0 860	0 124	45 89	0 151	2 421	197
1948	0 238	0 953	0 152	55 20	0 168	3 562	200
1949	0 199	0 780	0 124	48 00	0 145	2 512	167
1950	0 218	0 743	0 104	51 90	0 147	2 351	169
1951	0 281	0 945	0 125	52 53	0 203	2 724	209
1952	0 344	0 907	0 126	68 00	0 193	3 150	236
1953	0 254	0 827	0 128	50 80	0 196	3 084	196
1954	0 226	0 777	0 109	51 93	0 128	2 731	175
1955	0 243	1 152	†0 096	‡62 446	0 177	3 545	210

* surfacing and haul †Crushed Gravel Base Course (1" Max), type most used ‡Asphaltic Material AC (85 100), type most used

Oregon, Composite and Sub-Indexes—1940 = 100

Year	Grading	Cr rock surface	Bit mac surface	Asph conc pavement	Port cmt conc pave	Conc bridge & structs	Composite index
1940	100 0	100 0	100 0	100 0	100 0	100 0	100 0
1941	108 2	127 7	117 7	112 2	120 2	115 2	115 9
1942	181 2	187 5	125 9	141 1	164 5	160 3	156 8
1943	164 7	175 9	167 5	146 2	208 8	156 5	158 0
1944	202 4	199 2	147 3	125 3	166 4	184 1	166 4
1945	159 2	163 9	139 4	118 3	141 1	199 3	145 5
1946	171 0	175 1	147 8	116 6	155 0	205 5	155 9
1947	211 2	183 5	160 5	118 3	215 2	247 1	185 1
1948	218 1	193 9	174 7	151 6	235 8	272 2	198 6
1949	181 0	169 6	173 4	145 6	231 1	250 0	181 1
'50 Q 1	133 9	150 6	156 1	115 7	227 8	243 1	157 6
Q 2	132 8	174 9	158 5	127 1	227 8	210 0	162 2
Q 3	154 6	177 8	174 6	136 9	228 8	241 3	175 8
Q 4	155 7	190 8	185 7	135 9	227 8	276 4	187 4
'51 Q 1	190 8	180 9	184 5	124 5	227 8	269 0	187 7
Q 2	174 5	192 8	192 2	130 1	227 8	289 1	193 6
Q 3	186 8	213 7	210 8	123 9	240 5	265 9	201 0
Q 4	210 0	191 6	190 9	130 5	243 6	277 2	196 6
'52 Q 1	197 8	198 1	187 0	127 3	243 6	278 5	197 0
Q 2	191 1	210 4	177 3	135 3	243 6	280 0	199 5
Q 3	201 8	218 8	187 7	131 9	243 6	301 1	205 4
Q 4	202 9	219 3	188 8	137 3	243 6	282 7	207 2
'53 Q 1	187 4	160 6	186 3	115 5	221 5	247 6	176 3
Q 2	170 8	179 1	181 9	119 9	236 1	281 4	184 2
Q 3	173 4	184 7	184 9	116 3	234 2	266 9	184 1
Q 4	162 0	191 0	179 7	113 7	237 3	271 7	183 4
'54 Q 1	163 5	191 2	182 3	121 1	239 2	275 9	186 0
Q 2	158 7	146 2	170 1	119 5	239 0	264 4	167 2
Q 3	156 2	159 0	162 8	101 0	241 1	240 8	160 1
Q 4	150 2	142 6	165 0	100 8	240 5	264 5	160 5
'55 Q 1	146 0	123 4	176 3	102 6	240 8	269 1	156 1
Q 2	154 9	152 6	183 8	118 8	241 3	267 2	170 0
Q 3	162 7	118 1	151 5	102 4	241 1	285 3	155 2
Q 4	160 5	141 0	174 6	119 5	244 2	272 2	168 0
'56 Q 1	170 8	187 9	176 2	112 6	250 0	291 9	186 6
Q 2	206 6	155 0	185 3	122 7	253 2	305 3	188 5
Q 3	217 7	179 1	189 1	123 3	259 5	303 4	198 6

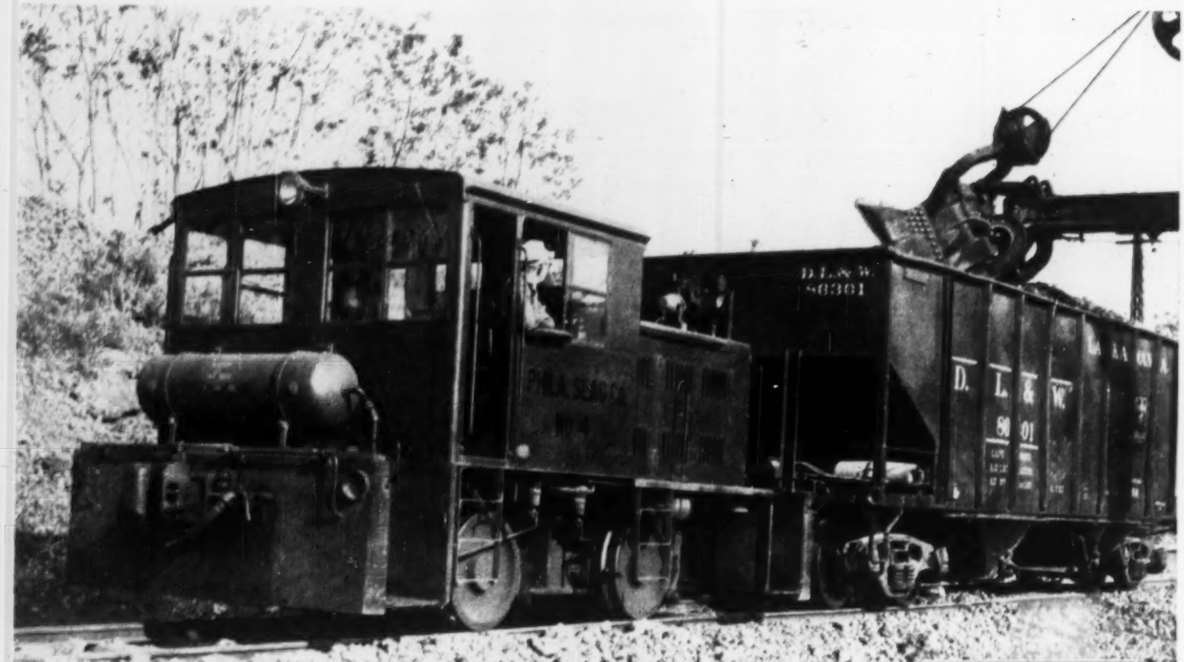
California, Average Highway Prices, Highway and Bridge Price Indexes

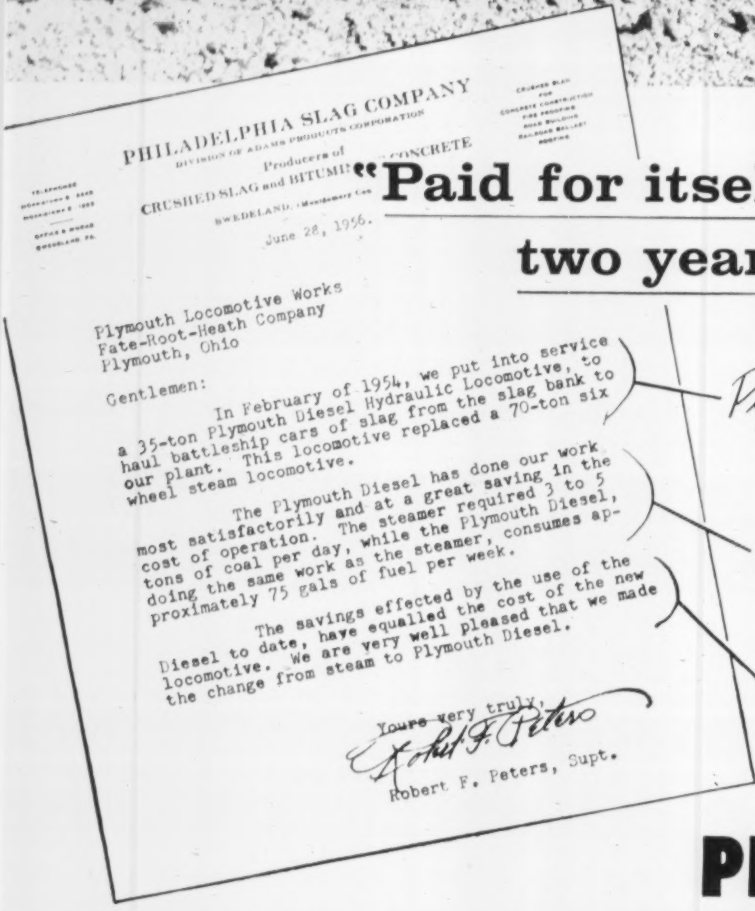
									Price Indexes	
Year	Rdwy excav $/cy	Crush run base $/t	Plant mix surf $/t	Asph conc pave $/t	PCC pavement $/cy	PCC structures $/cy	Bar reinf steel $/lb	Structural steel $/lb	Hwy const '40 = 100	Bridge const '39-'40 = 100
1940	$0 22	$1 54	$2 19	$2 97	$7 68	$18 33	$0 040	$0 083	100 0	99
1941	0 26	2 31	2 84	3 18	7 54	23 31	0 053	0 107	125 0	122
1946	0 41	2 45	4 00	4 68	9 48	37 38	0 060	0 099	179 7	197†
1948	0 55	2 43	4 30	5 38	13 04	49 86	0 092	0 126	216 6	229†
1949	0 49	2 67	4 67	4 64	12 28	48 67	0 096	0 117	190 7	199†
'50 Q 1	0 34	2 22	3 65	3 74		40 15	0 077	0 081	160 6	177
2	0 40	2 13	4 18	3 74	10 86	43 03	0 080	0 105	180 0	195
3	0 41	2 32	4 25	5 50	10 91	44 34	0 093	0 131	189 2	212
4	0 42	2 81	4 64	4 61	12 55	43 18	0 098	0 120	194 8	218
'51 Q 1	0 45	3 07	4 06	5 22	11 71	46 38	0 103	0 206	215 4	243
2	0 63	3 88	4 56	4 63	12 93	51 50	0 105	0 166	238 3	250
3	0 56	2 88	4 59	3 90	12 41	46 14	0 107	0 165	221 9	256
4	0 66	2 91	5 66	4 89	12 71	49 38	0 105	0 169	245 4	253
'52 Q 1	0 56	3 25	4 88	4 77	14 25	47 46	0 094	0 152	224 8	239
2	0 53	3 19	5 29	4 13	14 20	49 12	0 091	0 143	224 4	236
3	0 55	2 61	5 49	4 60	12 80	48 21	0 094	0 132	221 2	239
4	0 66	2 68	4 97		12 53	48 45	0 094	0 128	226 2	223
'53 Q 1	0 45	2 48*	5 27	4 46	12 47	53 19	0 098	0 150	218 3	243
2	0 50	2 07	5 38	4 59	13 06	52 68	0 091	0 132	217 5	224
3	0 54	2 15	5 30	4 82	13 78	49 23	0 092	0 129	218 0	231
4	0 48	2 11	4 74	4 47	14 77	53 41	0 105	0 139	216 7	235
'54 Q 1	0 45	2 28	4 23	4 78	14 89	47 52	0 092	0 126	199 4	221
2	0 38	2 09	4 29	5 18	14 28	47 12	0 093	0 114	189 0	217
3	0 43	1 85	4 68	7 00	12 63	49 59	0 095	0 167	207 8	220
4	0 35	1 78	4 83		13 13	46 08	0 094	0 135	192 2	213
'55 Q 1	0 39	1 69	4 55		13 44	40 66	0 095	0 140	189 3	217
2	0 42	1 99	5 39		14 46	51 36	0 098	0 136	212 4	237
3	0 41	2 33	5 43	5 70	13 46	49 64	0 093	0 132	208 6	229
4	0 37	2 00	5 52	4 00	15 05	52 72	0 099	0 144	212 6	237
'56 Q 1	0 40	2 08	5 40	6 50	14 05	52 51	0 105	0 166	219 5	245
2	0 51	2 06	6 27		14 64	57 13	0 113	0 219	255 9	284
3	0 52	2 27	6 12		15 57	56 32	0 121	0 178	249 1	260

† average of quarterly values * untrdt rock base substituted for crusher run at this point

The bridge price index is based on these items, quantities and weighted average 1939-40 prices:

Items		Quantities	1939-40 prices	Items		Quantities	1939-40 prices
Structure excavation	cy	156,286	$1.560	Misc iron and steel	lb	766,630	$0.138
Cl "A" port cmt concr,				Bar reinf steel	lb	35,958,000	0.040
structure	cy	176,634	18.420	Furn stee. piling	lf	79,329	1.790
footing block	cy	12,774	12.040	Furn concr piling	lf	146,861	1.600
Struct steel,				Driving stee piling	ea	2,313	25.290
plate g rder	lb	5,810,000	0.077	Driving concr piling	ea	3,781	40.840
rolled beam	lb	4,953,000	0.063	Steel bridge railing	lf	21,709	5.930
truss	lb	7,884,000	0.099	Concr bridge railing	lf	42,976	1.910





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OFFICE & WORKS
SWEDELAND, PA.

June 28, 1956.

Plymouth Locomotive Works
Fate-Root-Heath Company
Plymouth, Ohio

Gentlemen:

In February of 1954, we put into service a 35-ton Plymouth Diesel Hydraulic Locomotive, to haul battleship cars of slag from the slag bank to our plant. This locomotive replaced a 70-ton six wheel steam locomotive.

The Plymouth Diesel has done our work most satisfactorily and at a great saving in the cost of operation. The steamer required 3 to 5 tons of coal per day, while the Plymouth Diesel, doing the same work as the steamer, consumes approximately 75 gals of fuel per week.

The savings effected by the use of the Diesel to date, have equalled the cost of the new locomotive. We are very well pleased that we made the change from steam to Plymouth Diesel.

Yours very truly,
Robert F. Peters
Robert F. Peters, Supt.

"Paid for itself in two years operation"

Plymouth Torqomotive half as big as former locomotive

Hauls same loads but saves over $1000 in fuel monthly.

Pays for itself in 28 months.

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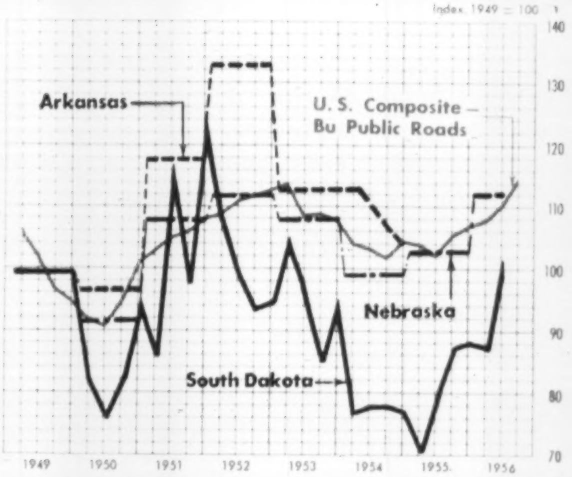
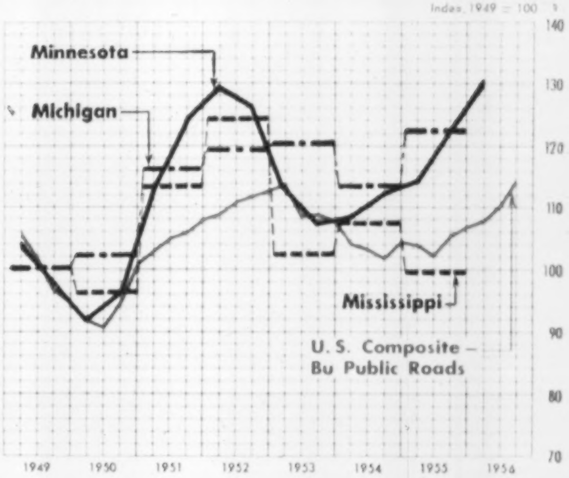




• **South Dakota's** highway price index is based on seven bid items (see table) and is corrected for upward bias which could be caused by substantial shifts in relative quantities of the seven items.

The South Dakota Highway Commission uses "Fischer's Ideal Index"—the root mean square of two weighted indexes.

In the first aggregate index, average quantities contracted for during 1950-53 are multiplied by the average unit price in 1940 to get a value weight of each item. These value weights are then converted into percentage weights based on the sum of the value weights.

Next, the average bid prices of contract items for each period are reduced to relatives of 1919 base year prices. These price relatives are multiplied by the percentage weights and summed to get the composite index.

The second aggregate index uses two additional sets of percentage weights. Average annual quantities for 1923-26 are used to compute annual price indexes for 1919-30 and average quantities for 1937-40 are used to compute price indexes for the year 1931-45. Weights used for the first aggregate index also serve the second index for the period 1946 to date.

• **Michigan State Highway** Department's highway price index rose to a new high in '55, reflecting increases in all major items included: concrete paving; grading and drainage; bituminous paving; and aggregate surfacing. For all items except concrete paving, the 1955 rise reversed a two-year decline. For concrete paving, it was the second consecutive yearly rise. Bituminous paving prices rose slightly, but averaged lower than in 1951-53.

South Dakota, Average Unit Prices and Price Index

	Roadway excav. $/cy	Cr. grav. Surf. $/t	Liq. asph. $/gal	Plt. Mix bit. surf. $/t	Conc. Cl A $/cy	Reinf. steel $/lb	Struct. steel $/lb	Composite Index '40 = 100
1940	$0.120	$0.59	$0.078	$1.49	$19.11	$0.044	$0.050	**100.0**
1941	0.128	0.64	0.087		19.52	0.049	0.054	**107.9**
1942		0.92	0.131					**159.8**
1943	0.299	1.06	0.117		21.62	0.061	0.400	**197.9**
1944		0.88	0.096					**138.5**
1945	0.270	1.21	0.106		38.69	0.078	0.096	**202.7**
1946	0.214	1.13	0.101	2.91	38.49	0.085	0.095	**177.6**
1947	0.235	1.35	0.140	3.49	46.22	0.113	0.128	**212.2**
1948	0.246	1.40	0.169	3.92	53.26	0.129	0.149	**230.5**
1949	0.197	1.40	0.159	3.83	54.01	0.125	0.135	**217.0**
'50 Q 1	0.166	0.93			53.37	0.115	0.137	**177.8**
2	0.171	0.88	0.139	2.17	49.54	0.114	0.135	**167.5**
3	0.174	0.97	0.135	2.86	58.21	0.127	0.141	**179.5**
4	0.199	1.05	0.111	3.00	51.33	0.136	0.681	**206.8**
'50	**0.175**	**0.95**	**0.135**	**2.74**	**53.13**	**0.123**	**0.139**	**176.3**
'51 Q 1	0.187	1.12	0.146	3.35	57.21	0.154	0.160	**189.3**
2	0.418	1.17	0.151	4.04				**254.6**
3	0.209	1.29	0.158	3.92	66.10	0.137	0.162	**217.0**
4	0.367	1.05	0.146		64.03	0.152	0.500	**268.0**
'51	**0.271**	**1.21**	**0.154**	**3.94**	**63.95**	**0.148**	**0.164**	**229.4**
'52 Q 1	0.231	1.51	0.161		53.39	0.149	0.152	**233.9**
2	0.263	1.10	0.151	3.25	56.81	0.133	0.155	**216.6**
3	0.246	0.97	0.147	2.63	55.30	0.148	0.170	**204.0**
4	0.218	1.31	0.135	2.54	55.47	0.143	0.178	**206.5**
'52	**0.242**	**1.18**	**0.146**	**2.89**	**55.37**	**0.141**	**0.160**	**212.6**
'53 Q 1	0.309	1.07	0.142	4.21	62.91	0.115	0.450	**227.1**
2	0.259	1.19	0.139	2.54	52.57	0.136	0.160	**210.0**
3	0.186	1.20	0.138	2.01	47.39	0.138	0.143	**186.4**
4	0.258	1.13	0.128	2.49	52.99	0.117	0.149	**206.8**
'53	**0.215**	**1.15**	**0.138**	**2.63**	**51.54**	**0.129**	**0.147**	**197.1**
'54 Q 1	0.157	1.03	0.120	2.37	46.15	0.110	0.168	**166.9**
2	0.163	0.94	0.126	2.34	49.62	0.118	0.155	**169.5**
3	0.164	0.93	0.120	2.24	51.75	0.127	0.133	**168.6**
4	0.189	0.91	0.113	2.16	49.62	0.121	0.135	**166.7**
'54	**0.171**	**0.95**	**0.121**	**2.26**	**49.23**	**0.119**	**0.148**	**168.6**
'55 Q 1	0.162	0.80	0.120	2.01	49.33	0.109	0.146	**154.9**
2	0.176	0.95	0.129	2.52	47.79	0.119	0.169	**172.8**
3	0.187	1.13	0.136	2.72	49.79	0.126	0.162	**189.4**
4	0.175	1.44	0.127	2.79	48.00	0.130		**189.8**
'55	**0.179**	**1.01**	**0.129**	**2.48**	**49.09**	**0.122**	**0.163**	**177.0**
'56 Q 1	0.187	1.07	0.134	3.03	53.12	0.133	0.165	**189.6**
2	0.261	1.05	0.111	3.40	56.62	0.134	0.607	**220.0**
3	0.212	1.44	0.141	3.12	50.27	0.136	0.185	**212.0**

Mississippi, Average Unit Prices and Index—'37-'41 = 100

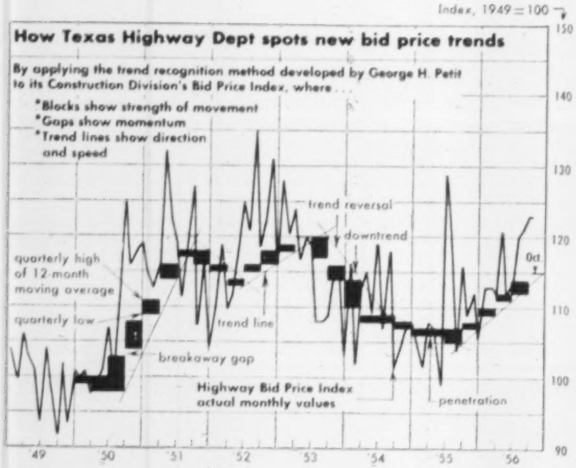
	Grading		Drainage	Cement concrete pavement				Bit pavement	
Year	Exc, uncl[a] $/cy	Topping[a] $/cy	B conc culv[b] $/cy	Plain cmt $/sy	7-5-7" RCC $/sy	8-6-8" RCC $/sy	9-6-9" RCC $/sy	Asph. prime $/gal	Cover mtls $/cy
1940	0.212	0.42	20.48	1.34	1.51	1.76	1.68	0.094	4.55
1941	0.250	0.42	25.61	1.71	2.20	2.58	2.50	0.072	
1942	0.398	0.41	32.60	2.62	2.32	2.73	2.65	0.17	
1943	0.267	1.26	27.98	3.25	2.44	2.88	2.81	0.179	6.00
1944	0.567	1.07	32.58	2.44	2.55	3.04	2.97	0.125	5.50
1945	0.671	1.21	38.66	2.58	2.95	3.47	3.36		
1946	0.311	0.62	42.46	2.72	2.28	2.38	2.49	0.11	5.25
1947	0.345	0.72	47.80	3.96	2.26	3.00	3.17	0.139	6.55
1948	0.325	0.79	48.41	3.80	2.78	2.82	2.95	0.17	7.03
1949	0.312	0.71	45.852	3.64	2.99	3.269	3.291	0.155	7.076
1950	0.260	0.797	42.16	3.50	2.78	4.00	2.57	0.165	6.72
1951c	0.320	0.78	52.87		3.90		3.39	0.17	6.77
1952	0.410	0.82	50.43		3.83[d]			0.17	6.85
1953	0.286	0.73	50.58		3.25[d]		2.74[e]	0.156	6.16
1954	0.307	0.84	47.72		2.79[de]	3.61[de]	3.18[de]	0.162	6.59
1955*	0.276	0.76	45.14		2.13[de]	2.50[de]	2.42[de]	0.157	6.43
Base prices	**34.8%**		**8.2%**	**20.2%**				**9.6%**	
'37-41	**0.235**	**0.346**	**20.53**	**1.64**	**1.48**	**none**	**1.60**	**0.094**	**4.56**
Sub wgt %	**64.1**	**35.9**	**8.2**	**0.3**	**34.8**	**1.6**	**63.3**	**50.3**	**49.7**

* First half of 1955. No contracts (emergencies excepted) let last six (6) months of commissioner's term of office. Mississippi Laws of 1948

[a] incl haul [b] incl D conc [c] first half of yr only [d] convrtd from 6" uniform

[e] convrtd from 8" uniform [f] creo [SI] sub index

	Gravel		Structures						Composite Index 100
Year	Surf course $/cy	Stab aggr $/cy	Conc, B&C bri $/cy	Reinf stl, bri $/lb	Str stl $/lb	Timber treated $/Mbm	Piling timb[f] $/lf	Piling stl $/lf	
1940	2.18	1.56	23.36	0.04	0.05	124.88	1.04		**100.36**
1941	1.91	0.81	27.98	0.05	0.06	139.30	1.25		**117.07**
1942	3.00		34.27	0.067	0.09	249.73	1.88		**158.79**
1943			30.35	0.06	0.094	176.00	1.54		**173.68**
1944	2.43		33.17	0.143	0.098	200.00	2.29		**196.10**
1945	4.00		60.00	0.09	0.10	205.55	2.31		**234.88**
1946	2.85	4.25	41.22	0.07	0.085	211.11	2.34	3.21	**163.42**
1947	2.55	4.43	49.96	0.09	0.112	237.50	2.37	3.93	**187.91**
1948	3.08	4.41	54.66	0.11	0.127	276.04	2.63	3.71	**197.10**
1949	2.337	2.218	46.534	0.102	0.114	232.91	2.133	2.735	**182.69**
1950	2.385	3.86	43.945	0.098	0.119	222.12	1.98	3.319	**175.48**
1951*	2.70	3.74	55.07	0.123	0.144	275.26	2.27	4.10	**206.49**
1952	2.13	3.99	59.00	0.123	0.156	277.78	2.25	5.44	**227.35**
1953	2.94	4.09	48.80	0.11	0.134	253.31	1.90	3.98	**188.75**
1954	2.66	4.40	49.23	0.12	0.13	290.24	1.95	3.91	**195.00**
1955*	2.90	3.19	47.25	0.115	0.12	255.75	2.02	3.66	**180.67**
Base prices	4.1%		23.1%						
'37-41	**1.98**	**1.67**	**23.04**	**0.043**	**0.052**	**121.27**	**1.19**	**1.80**	**100.00**
Sub wgt %	**32.1**	**67.9**	**44.9**	**12.4**	**27.1**	**1.5**	**6.6**	**7.5**	



• **The Texas Highway Department** calculates its highway bid price index by re-figuring a project costing $100,000 at average prices and quantities of highway projects let in the five-year period 1949-53.

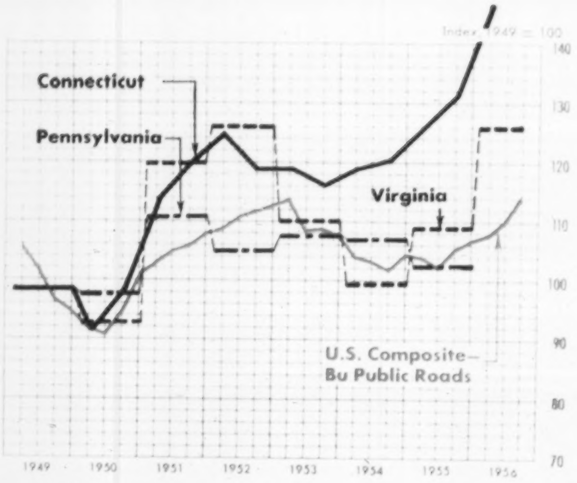
The chart above shows how the Highway Department adapts the trend recognition method developed by George H. Petit, Hartford, Conn. (ENR Sept. 4, 1952, page 98). Quarterly highs and lows of the 12-month moving average of the Texas highway bid price index form blocks which indicate the strength of price movements. When a block penetrates a trend line connecting preceding blocks, it means the trend is changing speed or direction. For instance, the second quarter '55 block penetrated the trend line. A new price uptrend followed, going into the fourth quarter of '56.

• **Connecticut** is the only eastern state reporting a highway price index for 1956 (Virginia and Pennsylvania compute their indexes annually). Connecticut's index climbed 11.1% between December '55 and June '56.

• **The Pennsylvania Department of Highways** computes its highway price index annually and no value for '56 is available. However, sharp increases in bid prices point to a rise in the 1956 index. Between the first half of '55 and first half of '56, average prices bid for class 1 excavation rose 50% and for class 2 excavation they jumped 59%. Bituminous surfacing prices soared by 58%. Moderate increases of 5-9% came in crushed aggregate base, reinforced concrete pavement, class A concrete and reinforcing steel bars.

Connecticut, Contract Price Index and Sub-Indexes, 1939 = 100.

Date	Structures	Grading drainage	Trunk line	Concrete pavement	Town aid	Composite
1939	100.00	100.00	100.00	100.00	100.00	100.00
1940	93.76	94.19	92.78	98.54	86.41	93.93
1941	128.27	110.00	115.14	106.92	108.94	116.66
1942	139.83	130.00	156.21	129.89	142.75	141.06
1943	...	...	...	...	...	...
1944	...	...	...	...	...	...
1945	138.65	175.09	160.97	138.04	168.62	151.47
1946	163.34	177.27	192.20	132.95	207.09	170.08
1947	180.34	217.98	193.44	147.76	234.24	186.44
1948	228.17	231.36	198.27	198.31	190.28	211.81
1949	196.49	184.51	171.42	190.96	163.09	184.64
Jun '50	174.09	182.77	166.05	167.95	160.65	170.82
Dec '50	195.10	197.82	173.02	184.15	163.36	184.98
Jun '51	235.69	234.30	179.83	213.20	193.70	213.13
Dec '51	252.43	239.35	185.82	226.63	195.51	223.70
Jun '52	267.63	249.80	191.92	221.24	212.13	231.91
Dec '52	243.75	234.06	192.07	216.57	216.61	221.45
Jun '53	239.88	232.88	194.06	221.70	212.35	221.22
Dec '53	235.74	225.04	191.60	216.46	207.25	216.74
Jun '54	243.38	228.84	195.22	220.31	210.78	221.75
Dec '54	244.96	230.03	198.27	222.94	214.08	224.01
Jun '55	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Dec '55	255.72	244.01	207.82	234.50	222.82	243.87
Jun '56	289.62	294.43	239.53	267.90	265.94	270.98



Virginia Highway Prices and Price Index

Year	Excavation		Surfacing		Structures			Composite Mile Index
	$/cy	Sub-Index	$/sy	Sub-Index	Reinf. Steel $/lb	Struct. Conc. $/cy	Sub-Index	
1937-41	$0.282	100.0	$1.012	100.0	$0.0494	$22.13	100.0	100.0
1937	$0.29	102.8	$0.91	89.9	$0.0500	$19.90	92.3	95.2
1938	0.29	102.8	1.02	100.8	0.0480	21.10	95.7	100.4
1939	0.25	88.7	1.02	100.8	0.0460	22.40	99.5	96.1
1940	0.25	88.7	1.04	102.8	0.0468	21.05	95.0	95.8
1941	0.33	117.0	1.07	105.7	0.0562	26.20	117.4	112.5
1942	0.46	163.1	1.33	131.4	0.0700	35.88	157.8	149.1
1943	0.57	502.1	1.50	148.2	0.0660	39.23	167.9	172.4
1944	0.49	173.8	1.55	153.2	0.0700	42.58	181.6	167.2
1945	0.55	195.0	1.53	151.2	0.0700	45.93	193.5	176.9
1946	0.53	187.9	2.05	202.6	0.0790	49.36	209.6	198.9
1947	0.55	195.0	2.00	197.6	0.0940	54.39	233.9	205.1
1948	0.67	237.6	2.26	223.3	0.1110	56.58	249.1	234.5
1949	0.55	195.0	2.01	198.6	0.1040	50.92	225.9	203.6
1950	0.55	195.0	1.66	164.0	0.1051	52.30	231.3	190.8
1951	0.71	251.8	2.00	197.6	0.1400	74.88	326.6	247.1
1952	0.77	273.0	2.00	197.6	0.1457	78.52	342.0	258.4
1953	0.61	216.3	2.01	198.6	0.1279	66.07	290.1	226.2
1954	0.48	170.2	2.00	197.6	0.1229	60.39	267.7	203.8
1955	0.60	212.8	2.14	211.5	0.1229	58.56	261.2	223.4

Pennsylvania, Weighted Average Unit Prices and Index

Year		Excavation		Cr aggr base 8"	Bit surf DP-1	RCC pvmt 9"	Concrete		Reinf steel bars	Annual Index
		Cl 1 $/cy	Cl 2 $/cy	$/sy	$-sy	$/sy	Cl A $/cy	Cl B $/cy	$/lb	'40 = 100
1935		$0.494	$1.470	$0.736	$0.561	$2.729	$18.660	$15.167	$0.041	...
1936		0.555	2.060	0.784	0.646	2.556	20.08	16.53	0.044	...
'37	H1	0.563	2.445	0.920	0.749	2.536	21.99	18.169	0.053	...
	H2	0.480	1.724	0.820	0.692	2.667	18.82	17.280	0.051	...
'38	H1	0.549	1.767	0.775	...	2.951	20.738	16.667	0.048	...
	H2	0.397	1.635	0.640	0.756	2.344	20.039	14.843	0.039	...
'39	H1	0.571	1.960	0.739	...	2.740	20.43	15.68	0.046	...
	H2	0.474	1.640	0.701	...	2.430	20.96	17.68	0.047	...
'40	H1	0.449	1.779	0.799	0.734	2.586	22.151	18.059	0.044	...
	H2	0.417	1.680	0.808	0.695	2.515	22.522	17.601	0.045	100
'41	H1	0.471	1.941	0.870	0.700	2.674	24.65	19.690	0.052	...
	H2	0.560	2.446	0.919	0.779	2.715	27.642	20.642	0.057	111
'42	H1	0.622	3.403	1.108	1.084	...	29.391	29.549	0.061	...
	H2	0.866	3.500	1.200	1.102	...	32.975	25.163	0.073	138
'43	H1	0.927	4.872	1.271		...	39.088	34.101	0.061	...
	H2	0.779	2.653	1.394	...	...	38.405	31.076	0.067	157
'44	H1	0.647	2.943	1.184		3.111	40.00	30.506	0.071	...
	H2	0.604	3.234	1.248		3.075	36.81	26.882	0.056	133
'45	H1	1.436	2.850	1.409	...	3.835	26.105	22.484	0.069	...
	H2	0.916	3.940	2.681	1.200	3.258	44.108	36.159	0.082	167
'46	H1	0.833	3.308	1.667	1.007	3.796	48.785	41.397	0.079	...
	H2	0.948	3.844	1.752	1.284	3.995	44.397	37.776	0.074	171
'47	H1	1.095	4.003	1.878	1.305	4.299	52.448	43.836	0.090	...
	H2	1.087	6.257	1.919	1.160	4.815	50.772	42.869	0.103	201
'48	H1	1.002	4.137	1.913	1.253	4.801	64.605	51.285	0.111	...
	H2	1.022	6.364	1.924	1.415	4.951	66.885	48.089	0.109	208
'49	H1	0.965	4.042	1.986	1.241	4.985	75.156	45.747	0.113	...
	H2	0.834	3.823	1.771	1.199	4.744	54.13	40.820	0.108	193
'50	H1	0.713	3.089	1.676	1.211	4.674	49.093	38.971	0.100	...
	H2	0.819	3.675	1.742	1,100	4.971	55.208	41.90	0.106	192
'51	H1	0.921	4.049	1.867	1.500	6.154	61.092	49.547	0.127	...
	H2	0.851	3.866	1.913	1.422	5.518	56.353	46.452	0.121	216
'52	H1	0.880	3.722	1.716	1.409	4.923	54.554	48.097	0.117	...
	H2	0.912	4.017	1.902	1.277	5.150	62.451	48.891	0.125	205
'53	H1	0.787	4.048	1.930	1.176	5.138	58.440	46.728	0.123	...
	H2	0.918	3.941	1.760	1.151	5.216	70.220	46.606	0.123	209
'54	H1	0.826	3.356	1.907	1.258	5.088	49.685	46.903	0.119	...
	H2	1.059	2.749	1.419	1.240	5.175	52.092	34.680	0.116	208
'55	H1	0.604	2.664	1.764	0.950	5.333	48.868	43.488	0.114	...
	H2	0.722	4.409	...	1.016	5.254	56.127	44.305	0.118	199
56	H1	0.904	4.243	1.861	1.500	5.715	53.208	41.998	0.122	

MELVINA ST. at North Ave. Built in 1925. Photos taken in 1925, 1955.

N. LUNA AVE. at Addison St. Built in 1925. Photos taken in 1925 and 1955.

HERE TODAY *and still here tomorrow*

that's the story of Chicago's CONCRETE STREETS

Here's what our cameraman saw when he returned to the same concrete streets in Chicago that were originally photographed 31 years ago. His photos are positive proof of concrete's durability and economy.

Durability and ***low-annual-cost*** service are typical of concrete pavements. Due to advances in engineering design, materials and construction methods, concrete pavement can now be built to last 50 years and more. Fewer, much thinner joints make for smooth riding.

Concrete streets are safest, too. Their gritty, skid-resistant surface permits quick stops—even in rain. At night, their light color gives maximum visibility.

For more information about designing durable, safe, ***low-annual-cost*** concrete streets, write for free literature, distributed only in the United States and Canada.

PORTLAND CEMENT ASSOCIATION

A national organization to improve and extend the uses of portland cement and concrete...through scientific research and engineering field work

Dept. 12a-17, 33 West Grand Avenue, Chicago 10, Illinois

SCHOOL ST., built in 1925. Photos were taken in 1925 and 1955.

DRAKE AVE., north of Addison St., was built in 1925. The photos were taken in 1925 and in 1955.

L
TO MARK PROGRESS

LADISH

SEAMLESS *Multiple Outlet* FITTINGS

Typical fittings and piping layout of coils in a charge heater.

LADISH DESIGNED 90° AND 45° ELBOWS

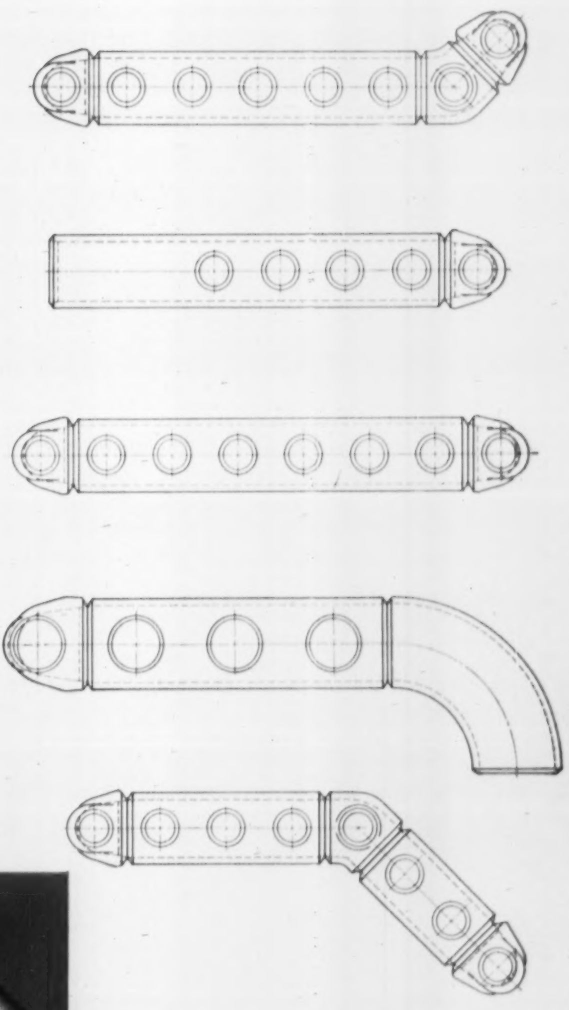
PATENT PENDING

Special die-forged Ladish 90° Reducing Heater Elbow provides a lower cost, easier to make up, final outlet and end closure. Obsoletes expensive, heavy-volume fillet weld required on straight blank-off design. Pressure drop is minimized and flow efficiency improved. Residue collecting pockets and stress risers at critical locations are eliminated. Provides ample clearance between fittings for ease of installation and more expansion allowance.

Ladish forged 45° Side Outlet Elbow effects positive savings in time and cost over the undesirable miter joint otherwise necessary. Eliminates time-consuming angle cutting and welding—then scribing, torching and nozzling-in of outlet directly over miter joint. Only two, easy-to-make circumferential butt welds required . . . deposition of weld metal at this critical juncture is minimized.

IMPROVE FLOW EFFICIENCY ...SAVE PIPING ERECTION COST IN HEATER INSTALLATIONS

Illustrated here are typical combinations of Ladish Multiple Outlet Fittings, 90° Reducing Heater Elbows and 45° Side Outlet Elbows produced to meet design requirements for heaters with varying flow cycles.

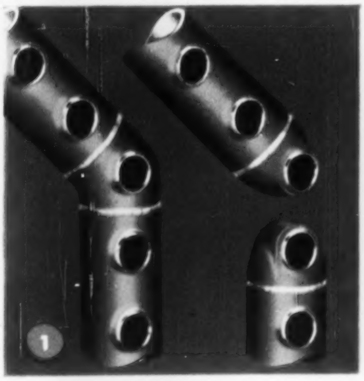


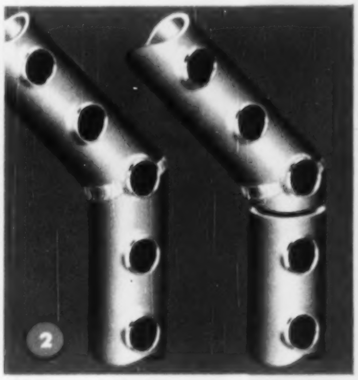
Seamless Multiple Outlet Fittings developed and produced by Ladish . . . offer you significant design advantages and installation and operational economies.

Only simple circumferential welds are required to join the integral outlets to heater tubes. Expensive nozzling-in and reinforcing operations are eliminated.

Ladish 90° Reducing Heater-Elbows and 45° Side Outlet Elbows used in combination with Ladish Seamless Multiple Outlet Fittings further cut installation costs . . . improve both design and flow efficiency.

These fittings are manufactured in a wide range of sizes and material specifications to the same rigid metallurgical and manufacturing standards which distinguish Ladish Controlled Quality Fittings.





① Ladish streamline design simplifies installation, improves flow efficiency and assures ample expansion allowance between coil sections.

② Obsolete miter joint construction leaves insufficient space between coil sections, complicates installation, restricts expansion.

THE COMPLETE *Controlled Quality* FITTINGS LINE

LADISH CO.

CUDAHY, WISCONSIN
MILWAUKEE SUBURB

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Chicago • St. Paul • St. Louis • Atlanta • Houston • Odessa • Tulsa • Denver
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LADISH CO.
Cudahy, Wisconsin

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AERO, pioneer and leader in aerial surveys, cuts ground survey time to a fraction—delivers topographic maps of engineering accuracy at tremendous savings in money . . . and manpower.

Precision AERO photomaps quickly provide basis for preliminary planning—save costly field trips—prevent premature land speculation.

AERO photogrammetrists, with up-to-date stereoplotting instruments produce topographic maps of engineering accuracy. We've completed as high as 465 miles of highway maps in 75 days . . . and these dependable maps were so detailed, they were used for preliminary location and design.

AERO has 35 planes ready to map for you anywhere. Our mapping crews have over 3,000 miles of highway survey experience. They know how to get the job done for you without delays or trouble.

Find out how AERO highway mapping experience—mapping projects in 23 states now in progress—can benefit you under the new federal program. Write, phone or wire!

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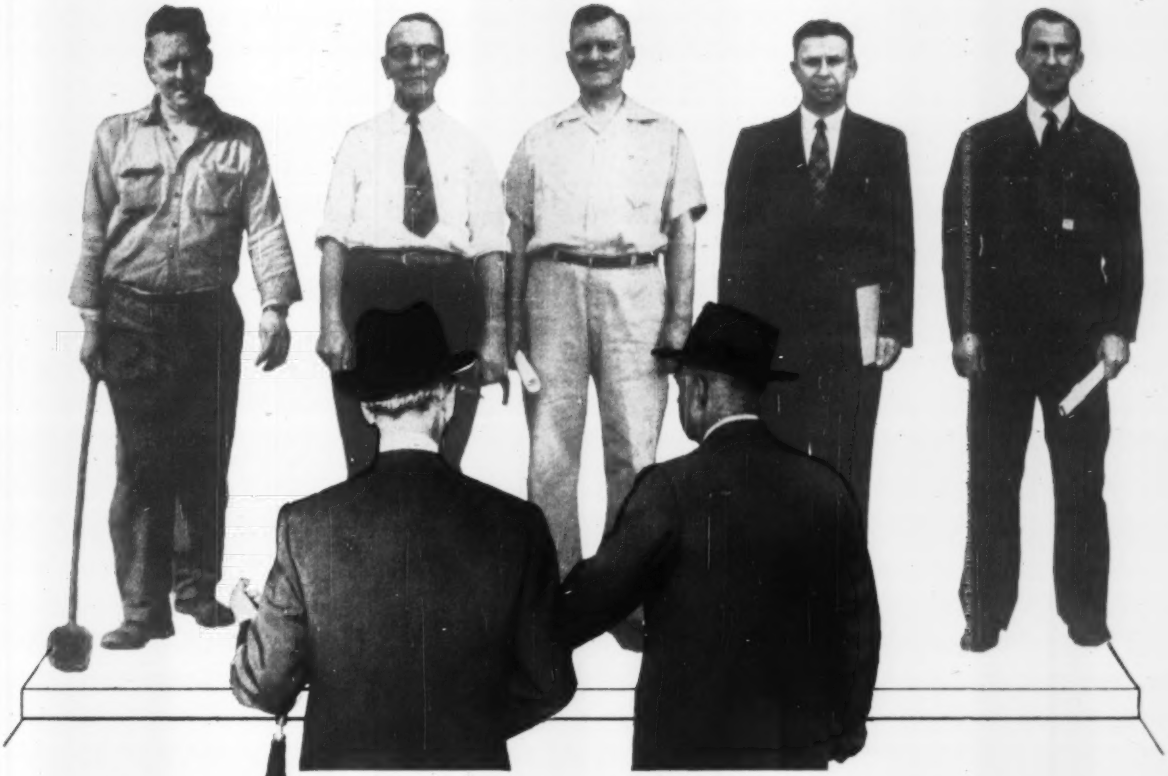

If you paid us a visit with your Wickwire Rope Distributor...

(and we hope you do)

WICKWIRE SPENCER STEEL
WIRE AND ROPE PLANT
NO ADMITTANCE
WITHOUT PASS

... you'd see skilled craftsmen like these—men who are helping produce top-quality Wickwire Rope, Slings and Strand. You'd find:

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the **DIE MAKER,** who prepares the dies needed to produce the right wire

the **CLOSER OPERATOR,** who skillfully fabricates the wire rope

the **METALLURGIST,** who certifies that the wire has the proper physical and chemical properties

the **SALES ENGINEER,** who's always ready to help you

and ***many others*** like them who are constantly working to keep Wickwire in its position of leadership in the production of top-quality products.

They're all good reasons why your Wickwire Distributor knows he's got top-quality wire rope, slings and strand to sell... and that these products will serve you well.

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WICKWIRE ROPE

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A PRODUCT OF THE COLORADO FUEL AND IRON CORPORATION

Deferred Wage Increases Will Push Costs Up

The effort to stabilize labor costs through use of collective bargaining agreements running for more than one year has committed contractors in many areas to automatic wage increases averaging 11.75 cents an hour next year. This compares with 1956 increases that have been hitting an average of about 14½ cents an hour.

An ENR survey of union wage rates for 27 construction labor classifications in 55 cities across the nation (table below) has turned up deferred wage increases ranging from two cents to 35 cents an hour in 1957. A continuing trend toward use of longer-term contracts is apparent, with preference shown for contracts of two year's duration. Generally, however, little headway has been made in achieving uniform contract expiration dates, or in rolling the collective bargaining season back to the winter months when interference with construction activity might be minimized.

The most common deferred wage increases for next year, disclosed by the survey, are 10, 12½ and 15 cents an hour. Each of these amounts occurs with about the same frequency. In a few instances, the amounts are paid in two installments, each effective a few months apart. But no pattern emerges with respect to the amount of increase or its payment either geographically or by labor classification.

Among the classifications on which reports were received, stone masons, cement finishers, electrical workers and operating engineers appear to have won the highest deferred wage increases, and glaziers and teamsters the lowest. The accompanying table shows how the averages shape up by classifications.

Average Deferred Wage Hikes For Construction Trades in '57

Trade	¢/hr	Trade	¢/hr
Cement finishers	15.75	Welders	11.75
Stone masons	15.0	Laborers, heavy	11.25
Electrical workers	15.0	Roofers	11.25
Hoisting engineers, 2-drums	15.0	Sheetmetal workers	11.25
Plasterers	13.0	Plumbers	10.5
Steamfitters	13.0	Iron workers structural	10.25
Carpenters	12.5	Bricklayers	10.0
Laborers, building	12.5	Masons' helpers	10.0
Painters	12.5	Waterproofers	10.0
Hoisting engineers, 1 drum	12.5	Lathers	8.75
Tractor operators	12.5	Iron workers, reinforcing	8.33
Tile layers	12.0	Terrazzo workers	8.0
Power shovel operators	11.75	Teamsters	7.5
		Glaziers	6.0

• Qualifications and comparisons—Most generalizations about construction wage rates can be used as rough guides only. Existing rates, locally determined, are usually dictated by local factors that defy ready comparison; no two surveys are the same; coverage varies and is apt to be spotty. The dangers increase with long-term contracts because of the compounding of local differences; the fact that some deferred increases may be subject to renegotiation has perhaps been overlooked; we assume, for example, that the deferred increases to which we refer are fixed and irrevocable.

With these qualifications, our figure of 11.75 cents an hour for the average of 1957 deferred increases appears to be reasonably valid.

The Bureau of National Affairs, for instance, in a survey of 101 third-quarter 1956 settlements, reported 11.9 cents an hour as the average deferred wage increase under construction industry labor contracts—of more than a year's duration.

Transposed to local areas, however, our figure has little validity. The results of two other surveys indicate the problem:

1. The California Department of Industrial Relations, in a survey of third-quarter 1956 agreements covering 500 or more construction workers, reported 7.93 cents as the average of 1957 deferred wage increases.

2. According to an analysis made by the New York State Labor Department of construction contracts negotiated between April 1 and September 30 of this year, the state average of 1957 deferred wage increases is 15¼ cents.

• Duration and termination—The essential factor in stabilization of labor costs—a contract of more than one year's duration—appears to have gained favor, although slowly. While some cities, such as Philadelphia, Penna., are now on a predominantly two-year contract basis, other areas continue to follow the one-year practice. According to some reports, two-year contracts have not yet caught up in number with one-year contracts. Contracts of more than two years in duration are still very scattered.

Even in bargaining areas with some longer-term contracts, progress toward stabilization appears to be slow, apparently because of the difficulty in integrating the various bargaining sessions. In Charlestown, W. Va., for example, out of 20 of the existing

(Continued on page 126)

For the wage rates to which these footnotes apply, see facing page

Note: Rates rounded to nearest cent. BR Base Rate FB Fringe Benefits * Same as craft doing work ‡ 7-hr day ∥ 6-hr day •*a* eff 10/1/56 •*b* eff 12/1/56 •*c* Under 4 cy, $2.05 over 4 cy, $2.12 5T & over •*d* eff 9/12/56 •*e* eff 11/1/56 •*f* eff 10/15/56 •*g* eff 9/10/56 •*h* eff 11/5/56 •*i* eff 12/30/56 •*j* This work done out of Birmingham

RANGES: •A 1.85-2.10 •B 2.55-2.80 •C 3.25-3.40 •D 2.85-3.00 •E 2.60-3.10 •F 2.14-2.60 •G 2.75-3.05 •H 2.20-2.75 •I 0.75-1.00 •J 1.25-1.50 •K 1.00-3.00 •L 1.75-2.00 •M 2.63-2.85 •N 3.07-3.33 •O 2.92½-3.91 •P 2.72-2.94 •Q 2.90-3.00 •R 1.49-1.74

BENEFITS: •1 7½¢ WF •2 10¢ WF •3 8¢ WF •4 5¢ WF •5 10¢ H&WF •6 7½¢ H&WF •7 7¢ H&WF •8 15¢ H&WF, 5¢ Advtg •9 10¢ H&WF, 1¢ Appren, 2¢ Admin •10 6¢ H&WF •11 15¢ H&WF, 10¢ PF, 2¢ Plumb Ind •12 11¢ H&WF •13 10 PH •14 8¢ VF •15 3½¢ PF •16 10¢ PF •17 23¢ WF •18 22½¢ WF •19 21¢ WF •20 9¢ WF, 15¢ PF •21 7¢ WF, 15¢ PF •22 15¢ PF •23 12¢ WF •24 3½¢ WF •25 16½¢ WF •26 9½¢ WF •27 $2.25/weekly WF •28 10¢ ins, 5¢ PF •29 12½¢ WF •30 3¢ Promotional Fund •31 5¢ Industry Promotion •32 15¢ H&WF •33 7½ VF •34 12½¢ VF •35 10¢ ins, 19¢ H&V •36 10¢ VF •37 10¢ health ins, 5¢ VF, 5¢ PF •38 10¢ ins •39 10¢ ins, 5¢ H, 5¢ VF •40 10¢ WF, 14¢ VF •41 8¢ ins, 8¢ H •42 10¢ ins, 6¢ VF, 6 PH •43 8¢ WF, 5¢ PF, 23¢ VF, 10¢ ins •44 7¢ WF plus 7% gross payroll •45 10¢ group ins •46 7½¢ ins, 6 PH, 5¢ PF, 1½¢ educ & promotional fund •47 12½¢ ins •48 9¾¢ WF, 9¾¢ PF, 13¢ VF •49 10¢ WF, 5¢ VF, 5¢ H •50 8½¢ WF, 3¢ PF, 12¢ VF •51 7½¢ WF, 5¢ VF •52 18¢ WF •53 6¢ WF •54 12½¢ H&WF •55 6¢ VF plus 2¾% of pay for H&W •56 8½¢ H&WF •57 10¢ H&WF, 5¢ VF •58 8½¢ H&WF, 10¢ VF •59 5¢ Advtg •60 7½¢ H&WF, 2½¢ Educ •61 5¢ Educ •62 7¢ WF, 7¢ VF •63 7¢ WF •64 7¢ WF, 6½¢ VF •65 8¢ WF, 8¢ VF •66 .053 VF •67 .031 PF, .093 WF, .218 V&H •68 7½¢ WF, 15¢ VF •69 15¢ WF •70 5% WF, 3% PF, 6 PH •71 4% WF, 20¢ PF •72 3% WF, 3% PF •73 4% WF, 4% PF •74 5% WF, 3% PF •75 15¢ WF, 15¢ PF, 20¢ BF •76 3% WF, 5% PF •77 8% FB •78 5% W&PF, 4% VF, 6 PH, 1% NC plus $4/day annuity contrib, 2% SS, 1% Joint Industry Bd Assessment •79 12% + 10¢/hr FB •80 3% WF, 3% PF, 2% VF, 1% EF •81 5% WF, 3% BF, 10¢ Security Fund •82 3% + 10¢/hr WF, 3% PF, 2% VF •83 4% WF, 4% PF, 6 PH •84 4% WF •85 7½¢ WF, 7½¢ VF •86 20¢ WF •87 15¢ WF, 11¢ PF •88 3% WF, 3% PF, 1% EF •89 3% WF, 3% PF, 2% VF •90 17¢ WF •91 10½¢ WF, 7½¢ PF •92 10¢ WF, 1½% PF •93 11½¢ WF •94 10¢ Industry prom •95 12½¢ H&WF, 7½¢ industry program •96 7½¢ WF, 8½¢ VF •97 7½¢ WF, 6½¢ VF •98 3% Vacation Stamp •99 5% VF •100 10¢ Trust Fund •101 8¢ WF, 4% VF, 1% PF •102 7½¢ WF, 12½¢ P&VF •103 7½¢ WF, 4% VF, 3% Expense •104 7½¢ WF included in pay •105 15¢ VF, 10¢ PF •106 9¢ H&WF •107 8½¢ WF •108 12½¢ WF, 14¢ PF, 5¢ Joint Bd, 5¢ Prom •109 10¢ WF, 10¢ PF, 5¢ VF •110 60¢ per day WF •111 7½ WF, 4% VF, 1% PF •112 12½¢ WF, 12½¢ PF, 15¢ VF •113 19½¢ HW&FV •114 18¢ H&VF •115 21¢ HW&VF •116 17½¢ HW&VF •117 10¢ WF, 20¢ PF

OVERTIME (DT—Double Time; TH—Time & one-Half): •a DT •b DT all but (TH) mas help •c DT all but (1st 3 hrs TH) carp, sheet met; (TH) lab, mas help, cement, paint, glaz, roof; (TH 5 PM 9 PM & Sat) elec; (TH 5 PM 12 PM & Sat) plumb, steam •d DT all but (TH lab, tr dr •e DT iron, plumb, steamf, weld •f DT brick, iron, mas & help, mos & ter, tile, lath, plumb, steamf, sheet met •g DT brick, plumb, steamf •h DT all but (DT Sun & Hol) lab, mas help, cement, tr dr; (DT Sat, Sun & Hol) mos & ter, tile, paint; (DT Sun) glaz •i DT all but (TH maint & repair work) elec; (DT Sat, Sun & Hol) glaz, roof, waterp; (DT Sun & Hol) tr dr •j DT except (TH 1st 2½ hr) lab, mas help; (TH 4:30 PM 7 PM) cement; (TH) elec, paint (TH after 8 hr reg day, DT Sat noon to 8 AM Mon & Hol) plumb, tr oper; (TH before 8 AM and after 4:30 PM) glaz, steamf, weld; (TH after 8 hr reg day, DT Hol) roof, waterp; (TH) reg day, DT Sat, Sun & Hol) sheet met; (DT legal hol) tr dr •k DT except oper engr, tr oper, shov oper, tr dr •l DT except (TH after 8 hr) lab, tr dr •m DT except (TH) lab, mos & ter, tile, cement, paint, glaz, roof, waterp, tr dr •n DT all but carp, lab, tile, oper engr, shov oper, tr dr •o DT except (TH) carp, lab, mas help, cement, elec, paint, glaz, roof, tr oper, tr dr •p DT except (TH) lab, cement, tr dr •q DT carp, brick, iron, plast, mos & ter, tile, lath, sheet met; (DT Sun & Hol) lab, cement, elec, roof, oper engr, tr oper, shov oper •r DT Sun & Hol lab, mas help, tr dr; (DT 6:30 PM 8:00 AM) cement; (DT) oper engr, tr oper, shov oper •s DT except (DT Sat, Sun & Hol) carp, cement, waterp; (DT Sun & Hol) lab, mas help, glaz, roof; (TH) elec; (DT) Hol paint; (DT 12 Mid 8 AM, Sat, Sun & Hol) steamf •t DT except (TH) lab, paint •u DT after 4:30 PM Fri, Sat, Sun & Hol, cement; (DT Sat, Sun & Hol) glaz, tile, mos & ter; (DT Sun & Hol) lab, roof; (DT new constr. & major repair) paint; (TH 1st 2 hrs on wk day) plumb; (TH 1st 3 hrs) sheet met •v DT lath, plumb, steamf, sheet met •w DT all but (TH) mos & ter, tile, elec, paint, tr dr •x DT except (TH 6 AM Mon to 4:30 PM Fri) lab; (TH 12 Mid Mon to Fri) tile, paint; (TH 4:30 PM to 12 Mid Mon Thurs) plumb, steamf; (DT Sat, Sun & Hol) roof, waterp, •y DT except (TH) lab, mos & ter, cement, paint, glaz, roof, waterp, sheet met, oper engrs, shov oper, tr dr •z DT Sun carp, brick, paint •aa DT brick, iron, stone mas, tr oper •bb DT except (TH) lab, mas help, mos & ter, tile, cement, elec, paint, glaz, roof, waterp, sheet met •cc DT except (DT Sat, Sun) lab, stone mas; (TH Mon to Fri) mos & ter, tile •dd DT except (DT Sun & Hol) lab; (TH) elec •ee DT brick, iron, stone mas, plast, mos & ter, tile, lath •ff DT all but (TH) lab, mas help, weld, tr dr •gg DT mos & ter, tile, lath •hh DT brick, iron, plumb, steamf •ii DT except (TH) tile, paint, glaz, oper engr, tr oper, tr dr •jj DT except (TH) cement, paint, glaz, plumb, steamf, roof, waterp, tr dr •kk DT except (TH 1st 4 hrs) lab; (DT Hol) paint; (TH 1st 2 hrs) roof, waterp; (TH) tr dr •ll DT except (TH) cement, roof; (TH 1st 2 hrs) glaz •mm DT except (TH) lab hvy, glaz •nn DT brick, iron, stone mas, plast, mos & ter, tile, lath, elec.

Building Trades Wage Rates – September 1, 1956

Quoted in $/hr., 8-hr. day; time and one-half for overtime after 40 hr. except where noted

Compiled by ENR

City and State			Carpenters	Bricklayers	Struct Irwkrs	Reinf Irwkrs	Labor Bldg	Labor, Hvy Constr	Stonemasons	Mason's Helpers	Plasterers	Mosaic & Terrazzo	Tile Layers	Cement Finishers	Lathers	Electrns (Inside)	Painters	Glaziers	Plumbers	Steamfitters	Roofers	Waterproofers	Sht Met Workers	Welders	Hoist Eng 1-Drum	Hoist Eng 2-Drum	Tract Op (30 hp+)	Shovel Operator	Truck Dr (1½T+)
Atlanta, Ga.	b	BR	2.80	3.35	3.05	2.80	1.45	1.45	3.35	1.45	3.00	3.35	3.35	2.20	3.00	3.20	2.85	2.65	3.05	3.20	2.00	2.00	3.00	3.05	2.45	2.80	2.53	3.05	1.75
Austin, Tex	c	BR	2.65	3.50	3.08	2.83	1.25	1.25	3.50	1.35	3.40	3.50	3.25	2.68	3.40	3.20	2.50a	2.50a	3.03	3.03	1.85[4]		3.13	*	2.68	3.03	3.03	3.03	1.25
Baltimore, Md	d	BR	2.95	3.45	3.50	3.25	1.80b	1.80b	3.45	1.95	3.25	3.07	3.07	2.95	3.25	3.30	2.68	2.73	3.20	3.20	2.90	2.90	3.20	*	2.55[B]	3.25[C]	2.85[D]	3.25[C]	1.70
		FB	.08[1]	.10[2]	.08[1]	.08[1]	.08[1]	.08[1]	.10[2]	.08[1]	.08[1]	.08[1]	.08[1]	.08[1]	.08[1]		.08[1]	.08[1]	.08[1]	.08[1]			.08[3]		.10[2]	.10[2]	.10[2]	.10[2]	.05[4]
Billings, Mont	e	BR	2.70	3.38	3.15	3.15	2.07	2.07	3.38	2.44	3.13	3.38	2.60	2.07	2.85	3.00	2.60[E]	2.55	3.00	3.00	2.53	2.53	2.75	3.00	2.53	2.75	2.75	2.83	2.14[F]
		FB																					.08[1]						
Birmingham, Ala	f	BR	2.70	3.50	3.00	2.75	1.50	1.60	3.50	1.60	2.92	3.10	3.10	2.78	2.70b	3.18	2.75	2.65	3.17	3.17	2.28	2.28	2.85	*	2.52	2.80	2.66	2.80	1.79c
		FB			.08[1]	.08[1]													.10[2]	.10[2]	.08[1]	.08[1]							
Bismarck, N D		BR	2.30	3.15	2.70	2.60	1.55	1.55	2.30	1.70	2.85		3.10	2.35	1.85	2.50	2.25	2.25	2.47	2.47	2.10	2.10	2.35	*	2.10	2.25	2.10	2.35	1.65
Boise, Idaho	g	BR	2.70	3.25	2.90	3.00	2.05	2.05	3.25	2.50	3.00		3.25	2.80	2.90	2.90	2.65	2.70	3.00	3.00	2.40	2.40	2.60	3.45	2.40	2.50	2.70	2.75[G]	2.20[H]
Boston, Mass	h	BR	3.05	3.50	3.55	3.50	2.30	2.30	3.50	2.30	3.50	3.25	3.25	3.29	3.25	3.20	2.60	2.78	3.05	3.20	2.88	2.88	3.10	*	3.40	3.40	3.03[13]	3.40[13]	2.45[13]
		FB	.10[6]	.10[6]	.08[6]	.08[6]	.07[7]	.07[7]	.10[6]	.07[7]	.20[8]			.10[5]	.20[8]	.13[9]	.10[5]	.06[10]	.27[11]	.10[5]	.10[5]	.10[5]	.11[12]						
Buffalo, N Y	i	BR	3.37d	3.57d	3.39d	3.39d	2.49d	2.49d			3.57b	3.25d	3.25d	3.29d	3.45	3.55e	3.08f	2.95a	3.30g	3.35b	3.03	3.03	3.38	3.39d	3.22		3.39	3.39	2.50d
		FB		.08[14]	.08[1]	.08[1]	.08[1]	.08[1]				.08[14]	.08[14]			.04[15]			.20[2,16]	.10[16]				.08[1]	.08[1]d		.08[1]d	.08[1]d	
Charleston, S C		BR	2.40	2.75	2.82	2.59	1.05	1.05	2.75	1.20	2.50	3.00	3.00	2.00	2.50	2.75	1.75	2.00	2.75	2.75	1.75	1.75	2.70	2.85	1.50	1.75	1.75	2.00	1.00
Charleston, W Va		BR	3.08	3.55	3.25	3.25	2.00		3.55	2.15	3.00	3.13	3.13	2.90	3.00	3.25	2.63	2.70	3.18	3.18	2.75	2.75	3.06	*	2.90	3.20a	2.65a	3.20a	2.15
		FB			.08[1]	.08[1]																							
Chicago, Ill	j	BR	3.35	3.63	3.55	3.53	2.58	2.58	3.63	2.58	3.55	3.45	3.45	3.25	3.55	3.48	3.28	3.57	3.35	3.37	3.65	3.65	3.28	3.37	3.25	3.25	3.00	3.60	2.08
		FB	.10[2]	.08[1]	.08[1]	.10[2]	.08[1]	.08[1]	.08[1]	.08[1]	.23[17]		.08[1]	.20[2,16]	.23[18]	.21[19]	.10[2]	.10[16]	.24[20]	.22[21]	.10[2]	.10[2]	.23[1,22]	.22[23]	.05[4]	.05[4]	.05[4]	.05[4]	.12[22]
Cincinnati, Ohio	k	BR	3.30	3.60	3.35	3.19	2.35	2.25	3.60	2.99	3.38	3.35b	3.35b	3.15	3.33	3.50	2.95	3.15	3.43b	3.50	3.15e	*	3.38h	*	3.08	3.33	3.08	3.33	2.20[27]
		FB			.08[1]	.08[1]										.04[24]			.17[25]	.10[26]									
Cleveland, Ohio	l	BR	3.58	3.55	3.50	3.50	2.83	2.75	3.55	2.88	3.58	3.30	3.40	3.58	3.58	3.60	3.25	3.38	3.48	3.48	3.58	3.58	3.50	3.33	3.45	3.45	3.33	3.58	2.50
		FB		.10[2]	.08[1]	.08[1]			.10[2]			.10[2]					.15[28]	.13[29]	.10[2]	.10[2]									
Columbus, Ohio	m	BR	3.05e	3.55e	3.25	3.25	2.15e	2.15	3.33	3.17	3.25e	2.93	2.93	2.85e	3.17	3.28	2.71	2.55	3.30b	3.30b	3.07	3.25	3.18e	3.25	3.08	3.08	3.08	3.33	2.15e
		FB			.08[1]	.08[1]				.03[30]	.03[30]				.03[30]								.08[1]	.08[1]					
Concord, N H	n	BR	2.60	3.50	3.50	3.50	2.15	1.35	3.50		3.50		2.60	3.50		2.62	2.00	2.00	2.45	2.45	2.15				3.10	3.10	2.65	3.10	1.50
Dallas, Tex	o	BR	2.95	3.70	3.13	2.85	1.55	1.55	3.70	1.70	3.44	3.00	3.44	2.95	3.44	3.13	2.82	2.68	3.10	3.10	2.35	3.70	3.10	3.10	2.80	3.08	2.63	2.63	1.55
		FB			.08[1]	.08[1]					.08[1]		.08[1]		.08[1]	.08[1]			.08[1]	.08[1]				.08[1]					
Dayton, Ohio	p	BR	3.10	3.60	3.28	3.16	2.26	2.26	3.33	2.34	3.27	3.33	3.33	3.00	3.27	3.46	3.00	2.85	3.30	3.30	3.10	2.88	3.10	3.28	3.08	3.08	2.73	3.36	2.42
		FB			.08[1]	.08[1]					.03[30]				.03[30]														
Denver, Colo	q	BR	3.08	3.75i	3.00	3.00	2.00	2.00			3.30	3.30	3.30	2.98	3.38	3.00	2.90	2.73	3.17	3.17	3.00	3.00	3.10	*	2.76	2.93	2.76	2.93	2.15
		FB			.08[6]	.08[6]					.13[6,31]				.05[31]				.15[6,31]	.15[32]	.10[5]	.10[5]							
Des Moines, Ia		BR	3.00	3.65	3.05	3.05	2.25	2.25	3.65	2.35	3.10	3.10	3.10	3.05	3.10	3.20	2.75	2.60	3.25	3.25	2.53		3.00	*	2.90	3.10	3.10	3.10	2.35
		FB														.15[6,33]			.20[6,34]				.15[6,35]						
Detroit, Mich	r	BR	3.20	3.53	3.48	3.22	2.45	2.45	3.00	2.45	3.51	3.15	3.35	3.00	3.35	3.50	3.08	2.98	3.46	3.45	3.71	3.00	3.25	*	3.20	3.20	3.30	3.20	2.45[37]
		FB	.20[36]	.20[2,36]	.20[37]	.10[38]		.20[39]		.20[39]	.24[40]	.16[41]	.10[38]	.16[42]	.46[43]	.07[44]	.10[45]		.14[46]	.14[46]	.13[47]	.16[42]	.33[48]		.20[49]	.20[49]	.10e	.20[50]	
Duluth, Minn	s	BR	2.75	3.30	3.20	2.95	2.10		3.30	2.20	3.13		2.75	2.69	3.00	3.00	2.65	2.42	2.95	2.95	2.83	2.69	2.85	*	3.00		3.22	3.22	
		FB	.08[1]				.08[1]			.08[1]				.08[1]	.08[1]	.24[50]	.08[1]	.13[51]	.08[1]	.08[1]	.08[1]	.08[1]	.08[1]						
Fort Worth, Tex	a	BR	2.88	3.75	3.13	3.13	1.40	1.40	3.75	1.50	3.38	3.00	3.00	2.95	3.38	3.13	2.75	2.63	3.18	3.18	2.45	2.45	3.18	3.18	3.13	3.73	2.00	2.00	1.50
Harrisburg, Pa	t	BR	2.78	3.38	3.60	3.35	1.88	1.88	3.38	2.03	3.00	3.38	3.00	2.93	3.00	3.06	2.40	2.52	3.00	3.00	2.43	2.13	2.85	*	3.43	3.43	3.06	3.69	2.03
		FB	.04[24]		.18[52]	.18[52]	.04[24]	.04[24]		.04[24]	.04[24]			.04[24]	.06[53]			.06[53]			.04[24]		.10[2]		.10[2]	.10[2]	.10[2]	.10[2]	.04[24]
Houston, Tex	u	BR	2.98	3.69	3.00	2.75	1.75		3.69	1.93	3.38	3.15	3.15	3.00	3.38	3.25	2.75	2.78	3.18	3.40	2.73	2.73	3.13		2.75	3.25	3.25	3.25	2.03
		FB			.08[1]	.08[1]					.03[30]				.08[1]	.15[55]			.15[55]				.08[1]						
Jackson, Miss	v	BR	2.50	3.25	2.85	2.85	1.25	1.00			2.75			2.63	2.75	2.90	2.38		3.00	3.00	2.00	2.00	2.75		2.40		2.40	2.65	1.60
Jacksonville, Fla	w	BR	2.60	3.10	3.05	2.80	1.20	1.20	3.10	1.25	2.88	3.00	3.00	2.28	2.88	3.25	2.38	2.48	3.10	3.10	2.45	2.45	2.80	*	2.55	2.55	2.14	2.55	1.50
Kansas City, Mo	x	BR	2.95	3.70	3.08	2.93	2.16	2.18	3.38	2.25	3.38	3.30	3.30	2.95	3.13	3.33	2.90	3.00	3.30	3.15	2.80	2.70	3.20	*	2.85	3.10	2.32	3.10	2.12
		FB														.10[2]													
Los Angeles, Calif	y	BR	3.00	3.80	3.40	3.15	2.30	2.30	3.80	2.63	3.75	3.32	3.26	2.93	3.75‡	3.60	3.01‡	2.89	3.53	3.53	3.00	3.00	3.24	*	2.95	2.95	3.05	3.30	2.41
		FB	.10[5]		.10[5]	.10[5]	.08[6]	.08[6]		.08[6]	.13[54]		.06[55]	.10[5]	.13[54]		.09[56]	.08[6]	.10[5]	.10[5]	.15[57]	.15[57]	.19[58]		.10[6]	.10[6]	.10[6]	.10[6]	.08[6]
Louisville, Ky	a	BR	3.15	3.15	3.30	3.28	2.13	2.25	3.30	2.34	3.30	3.00	2.30	3.00	3.13	3.30	2.90	2.83	3.30	3.45	2.45	3.30	3.28		3.15	3.15	2.65	3.15	2.35
		FB			.08[6]	.08[6]					.05[59]					.08[6]			.10[60]	.10[60]		.05[61]	.08[6]						
Meridian, Miss	z	BR	2.25	3.00	j	j	0.75j	0.75j	3.00	1.25j	2.60	3.00	3.00	2.50	2.38	3.00	2.50	1.65	2.75		2.00	2.60	2.75	1.00[K]	j	j	1.50	1.75j	1.94
Milwaukee, Wis		BR	3.15	3.40	3.17	3.17	2.38		3.40	2.50	3.21	3.31	3.15	2.95	3.21	3.20	2.75	2.77	3.21	3.21	2.90	2.90	3.05	3.17	2.98	*	3.14	3.31	2.34[27]
		FB	.14[62]	.07[63]	.07[63]	.07[63]	.07[63]		.07[63]	.07[63]	.14[62]	.14[62]	.14[64]	.07[63]	.14[62]	.16[65]	.14[62]	.06[66]	.07[63]	.07[63]			.14[62]	.07[63]	.07[63]		.07[63]	.07[63]	
Minneapolis	aa	BR	3.00	3.43	3.17	3.07	2.25	2.25	3.43	2.25	3.05	3.00	2.95	3.10	3.05	3.12	2.85	2.66	3.07b	3.07b	2.85	2.85	2.98e	*	2.95	2.95	2.63[M]	3.07[N]	2.25
		FB									.23[2,16,30]				.23[2,16,30]	.34[67]			.20[2,16]	.20[2,16]			.23[68]						
Nashville, Tenn	bb	BR	2.58	3.25	2.90	2.80	1.25	1.25	3.25	1.40	3.00	3.00	3.00	2.40	2.88	3.00	2.50	2.42	3.05	3.05	2.30	2.30	2.75		2.20	2.45	2.20	2.65	1.70
New Orleans	cc	BR	2.68	3.25	3.10e	3.10e	1.55e	1.55e	2.63	1.63	2.83	2.76	2.76		2.68	3.03	2.40	2.50	3.00	3.00	2.65		2.82	3.03	2.80	2.80	2.15	2.80	1.68
		FB		.05[4]	.08[1]	.08[1]					.05[4]								.15[69]	.15[69]	.08[1]		.08[1]	.08[1]	.08[1]	.08[1]		.08[1]	
New York, N Y	dd	BR	3.65‡	4.05‡	4.05	3.75‡	2.60	2.60			4.00#	3.70	3.73	3.75‡	3.75‡	3.50	3.21‡	3.75‡	3.75‡	3.85‡	3.75	3.65‡	3.75‡		3.90	3.90	3.28	4.15	2.21
		FB	.29[70]	.36[71]	.24[72]	.30[73]	.21[74]	.21[74]			.50[75]	.30[76]	.30[77]	.30[78]	.30[73]	.38[78]	.26[75]	.30[76]	.22[79]	.35[80]	.30[74]	.37[81]	.40[82]		.31[83]	.31[83]	.26[74]	.33[74]	
Newark, N J	a	BR	3.75‡	3.90‡	4.15						3.90‡			3.90‡	3.65‡		3.35‡		3.75	3.75	3.75‡		3.70‡						
		FB	.15[84]	.16[84]	.25[77]						.16[84]			.16[84]	.20[86]		.26[87]		.26[88]	.26[88]	.13[79]		.30[89]						
Ogden, Utah		BR	2.90	3.25	3.00	3.00	2.00	2.00	3.25	2.50	3.13	2.83	2.75	2.70	3.13	3.00	2.65	2.46	3.00	3.00	2.60	2.91	2.71	3.00	2.53	2.75	2.70	3.00	2.05
Oklahoma City	ee	BR	2.73	3.80	2.95	2.95	1.80		3.80	1.95	3.30	2.75	2.75	3.00	3.30	3.25	2.60	2.65	3.15	3.15	2.55		2.95		2.65	2.65	2.65	2.65	1.95
Omaha, Nebr	ff	BR	2.93	3.43	3.00	3.00	2.00	2.00	3.43	2.13	3.20	2.85	2.85	2.90	2.48	3.25	2.50	2.48	3.22	3.22	2.35	2.35	2.93	2.11	2.65	3.00	3.00	3.00	2.05
Philadelphia, Pa	a	BR	3.39	3.75	3.70	3.70	2.10	2.40		2.10	3.65	3.55	3.38	3.38	3.53	3.78	2.90	3.00	3.75	3.75	3.15	3.15	3.44	3.44	2.93[O]	2.93[O]	2.93[O]	2.93[O]	2.35
		FB		.17[90]	.18[91]	.18[91]					.15[69]		.13[29]		.13[29]	.15[92]	.13[29]		.12[93]	.12[93]	.10[2]	.10[2]	.20[2,16]	.20[2,16]	.10[2]	.10[2]	.10[2]	.10[2]	
Phoenix, Ariz	gg	BR	3.03	3.75	3.25	3.00	2.18	2.39	2.96	2.26	3.43	2.58	3.50	2.96	3.43	3.23	2.75	2.63	3.35	3.10	2.76		3.07	2.75	2.99	3.17	3.00	3.17	2.29
		FB			.10[2]	.10[2]					.10[94]				.10[94]		.10[2]		.20[95]	.20[95]			.09[96]						
Pierre, S D	hh	BR	2.35	3.10	2.88	2.88	1.37	1.50	3.10	1.65	2.75	3.00	2.35	2.50	2.75	2.85	2.20	2.27	2.93	2.93	2.35	2.35	2.40	*	2.60	3.00	2.60	3.10	2.00
Pittsburgh, Pa		BR	3.33	3.75	3.30		2.25	1.98	3.60		3.40	3.40	3.25		3.45	3.50	3.50	3.00	3.42	3.43	3.15	3.03	3.43		3.35	3.35	3.20	3.35	2.20
		FB	.08[1]	.18[16]	.08[16]		.05[4]	.10[2]			.18[1,16]	.18[1,16]	.08[1]	.18[88]			.10[28]		.18[1,16]	.08[1]	.08[1]	.08[1]	.08[1]		.08[1]	.08[1]	.08[1]	.08[1]	.08[1]
Portland, Ore	ii	BR	2.80	3.50	3.07	2.87	2.25	2.25	3.50	2.65	3.25	2.90	3.15	2.90	3.15		2.75	2.81	3.25	3.25	3.00	3.00	3.00		2.62	2.94	2.72[P]	2.90[Q]	2.45
		FB	.10[2]	.08[1]	.10[2]	.10[2]	.10[2]	.10[2]	.10[2]	.10[2]	.10[2]		.10[2]		.10[2]		.08[1]		.10[98]	.10[98]	.08[1]	.08[1]	.14[97]		.10[2]	.10[2]	.10[2]	.10[2]	.08[1]
St. Louis, Mo	a	BR	3.25	3.75	3.25	3.25	2.30	2.30	3.75	2.75	3.43	3.50	3.10	3.53	3.43	3.60	3.25e	3.55e	3.55	3.55	3.20		3.55	*	2.78	3.33	3.33	3.33	2.30
		FB	.08[1]	.19[1,99]	.08[1]	.08[1]	.08[1]	.08[1]	.19[1,99]	.08[1]	.08[1]		.23[1,99]	.10[100]	.08[1]	.26[101]	.08[1]	.10[2]	.20[102]	.21[19]	.05[4]		.32[103]		[104]	[104]	[104]	[104]	.08[1]
St. Paul Minn	aa	BR	3.00	3.43	3.17	3.07	2.25	2.25	3.43	2.25	3.15	3.00	2.95	3.10	2.90	3.12	2.85	2.66	3.00	3.00	2.85	2.85	3.00	*	2.95	2.95	2.63[M]	3.07[N]	2.25
		FB									.23[2,30,36]				.13[30,36]	.34[67]			.20[2,36]	.20[2,36]			.25[105]						
Salt Lake City		BR	2.90	3.25	3.00	3.00	2.00	2.00	3.25	2.50	3.13	2.83	2.75	2.70	3.13	3.00	2.65	2.46	3.00	3.00	2.60	2.91	2.71	3.00	2.53	2.75	2.70	3.00	2.05
San Antonio, Tex	jj	BR	2.75	3.38	3.13	3.13	1.38	1.75	3.38	1.49[R]	3.38	2.65	2.65	2.75	3.38	3.13	2.50	2.50	3.18	3.18	2.25	1.90	3.13	2.38	2.95	2.95	2.95	2.95	1.93
San Diego, Calif	y	BR	3.00	3.75	3.25	3.00	2.30	2.30	3.75	2.50	3.63	3.25	3.25	2.93	3.63	3.25	2.94‡	2.90	3.53	3.53	3.00	3.00	3.15	*	2.95	3.30	3.05	3.30	2.41
		FB	.10[5]	.08[6]	.10[5]	.10[5]	.08[6]	.08[6]	.08[6]	.08[6]	.10[5]			.10[5]	.10[5]	.10[5]	.09[106]	.08[6]	.10[5]	.10[5]	.08[6]	.08[6]	.09[106]		.10[6]	.10[6]	.10[6]	.10[6]	.08[6]
San Francisco	kk	BR	3.26	3.75‡	3.40	3.15	2.33	2.33	3.75	2.90	3.61	3.75	3.26	3.00	3.43	3.38	3.10‡	2.87	3.45	3.45	3.00	3.00	3.30	3.40	2.98	3.14	3.10	3.43	2.33
		FB	.10[2]	.37[108]	.10[2]	.10[2]	.10[2]	.10[2]	.37[108]	.25[109]	.20[2,36]	.37[108]	.08[1]	.10[2]	[110]	.24[111]	.09[107]	.16[36]	.40[112]	.40[112]	.15[2,36]	.15[2,36]	.08[1]	.10[2]	.10[2]	.10[2]	.10[2]	.10[2]	.10[2]
Seattle, Wash	ii	BR	2.80	3.55	3.07	2.87	2.37	2.37	3.55	2.67	3.28	2.40	3.23	2.90	3.23	3.20	2.81	2.77	3.15	3.15	2.90	2.90	3.10	3.28	2.90	2.90	3.00	3.36	2.63
		FB	.10[5]	.10[5]	.10[5]	.10[5]	.10[5]	.10[5]	.10[5]	.10[6]	.10[5]	.10[5]	.10[6]		.10[5]	.20[113]	.08[6]	.18[114]	.21[115]	.21[115]			.18[116]	.08[6]	.10[6]	.10[6]	.10[6]	.10[2]	.08[1]
Tacoma, Wash	mm	BR	2.80	3.65	3.07	2.87	2.37	2.37	3.65	2.75	3.30	2.98	2.98	2.90	3.20	3.35	2.81	2.70	3.15	3.15	2.90	2.90	3.10		3.05	3.36		3.36	2.63
		FB	.10[5]	.10[5]	.10[5]	.10[5]	.10[5]	.10[5]	.10[5]	.10[5]	.10[5]	.10[5]	.10[5]	.10[5]	.10[5]	.10[5]	.10[5]	.10[5]	.10[5]	.10[5]	.10[5]	.10[5]	.10[5]		.10[6]	.10[6]		.10[6]	.08[6]
Toledo, Ohio	a	BR	3.40e	3.40	3.40	3.40e	2.52	2.52	3.51	2.65	2.70	3.33	3.33	3.40	3.40	3.40	3.02	2.85	3.40	3.40	3.20	3.20	3.20	3.20	3.33	3.33	3.08	3.33	2.35
		FB	.07[63]	.07[63]	.07[63]	.07[63]	.07[63]	.07[63]	.07[63]	.07[63]	.07[63]	.07[63]	.07[63]	.07[63]	.07[63]	.07[63]	.07[63]	.07[63]	.07[63]	.07[63]	.07[63]	.07[63]	.07[63]	.07[63]					
Trenton, N J	a	BR	3.48	3.70	4.05						3.70			3.70	3.40		3.00		3.50	3.50	3.40		3.65						
		FB		.13[29]	.18[91]						.13[29]			.13[29]					.30[117]	.30[117]	.20[2,16]		.20[2,16]						
Tulsa, Okla	nn	BR	2.93	3.75	3.00	3.00	1.90		3.75	2.05	3.30	3.13	2.13	3.08	3.30	3.23	2.75	2.50	3.20	3.20	2.55		3.07	2.75	2.60	2.60	2.60	2.60	2.10

For footnotes, see facing page. These cover variations from the 8-hour day, time-and-a-half for overtime after 40 hours and the amounts included in these rates that are paid in the form of fringe benefits

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. . . Deferred Wage Increases

contracts, 12 expire in 1957, seven in 1958, and one in 1959; in Duluth, Minn., out of 22 contracts, two expire in 1957, 8 in 1958 and 12 in 1959. Phoenix, Ariz., on the other hand, appears to have had better luck—out of 25 of its contracts, 24 expire in 1958, one in 1959.

Progress appears to be similarly slow in achieving seasonally uniform contract expiration dates. An example is Houston, Tex., where, out of 23 contracts, 21 run to 1958 and two to 1959. Houston contract expiration dates, however, are still scattered through February, March, April, June and November. The situation is about the same in Boston, where expiration dates occur in March, April, May, June, August and December.

Some areas have worked toward uniform termination dates. Spring rather than winter appears to remain the preferred bargaining season. Some examples: New York City contracts for the most part now use June 30 as the expiration date; bulk of the contracts for classifications surveyed in Detroit, Mich., use April 30; all of the classifications surveyed in Cleveland, Ohio, are under contracts expiring May 1; all except five of the classifications surveyed in Chicago, Ill., use May 31, as do most of the trades in Buffalo, N. Y. Those surveyed in Baltimore, Md., use March 31.

• **Dilemma**—One of the bugs so far in stabilization of costs through use of long-term labor contracts has been the existence of conflicting views as to the value as well as the cost of such contracts to the negotiating parties. Future crystallization of these views may well retard the progress that has already been made.

To management, the value of a long-term contract is best measured by the fixed, irrevocable terms and conditions it contains. To labor, however, the flexibility written into the contract is apt to be a more valid test.

In the September issue of its "Collective Bargaining Report", for example, the AFL-CIO, with which the bulk of the building trades are affiliated, said that a "long-term agreement is a very substantial concession and must not be sold cheaply". Labor's principal concern has been that it avoid letting the long-term contract become a device through which it loses the power to increase the standard of living of organized workers, as opposed to keeping abreast of increases in cost of living. And this may become particularly significant in the construction industry, where most of the trades have been willing to negotiate deferred wage increases in fixed amounts without the additional protection of escalator clauses or the use of other compensating formulas.

Wage Increase Pattern in '56

Construction wages rose about 4% during 1956, as measured by the ENR 20-Cities average wage rates, including fringe benefits, for common labor, bricklayers, carpenters and structural ironworkers. Wage increases tended to be greater in '56 than in '55.

The 20-Cities average rate for common labor on buildings increased by 4.3% during '56 to $2.192 per hour, including fringe benefits. This represents an average raise of nine cents per hour since the end of 1955. For common labor on heavy construction, the average rate moved up 3.8% this year to $2.193 per hour, including fringes. This is up eight cents over the average rate at the end of '55.

The 1956 increases for common labor ranged from five cents to 17.5 cents per hour. In seven of the 20 cities, the increase topped 10 cents and unions in four cities came up with a 10-cent raise. However, the 1956 raise was less than 10 cents per hour in eight cities, while Baltimore laborers had no increase this year.

Average rates for the three key skilled trades rose 4% or more in '56. Bricklayers' and carpenters' rates moved up 4.2% on the average to $3.709 and $3.179 per hour, respectively. For the bricklayers, this represents an average raise of just under 15 cents per hour, while for carpenters it's about 13 cents per hour more than they were getting at the end of '55. Structural ironworkers' rates rose 4.0% for the year to $3.411 per hour, including fringes. This is 13 cents more than the average at the end of '56. Topping the increases for these skilled trades in the 20 cities were a 36.5 hike for San Francisco bricklayers and a 35-cent boost for Baltimore bricklayers. In fact, bricklayers racked up increases of 20 cents or more in seven cities in '56.

Most of the increases for carpenters were in the 10-15 cents per hour range, with eleven cities in the bracket. In six cities the raises were for 15 cents or more and in only three cities were increases below 10 cents. Ironworker unions in nine cities had increases of 15 cents or more. In seven cities they received raises of 10-14 cents and in only two cities less than 10 cents.

(Continued on page 128)

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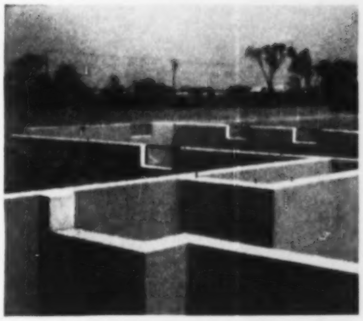

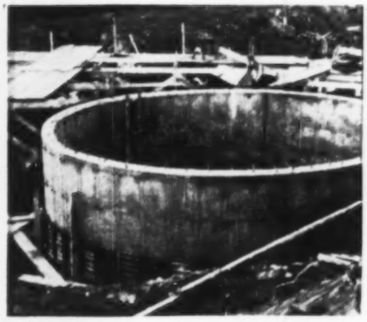

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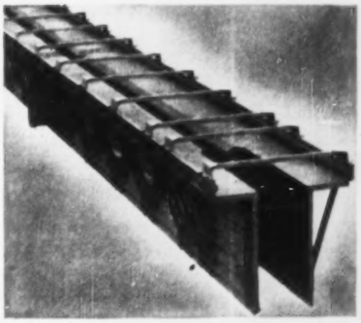

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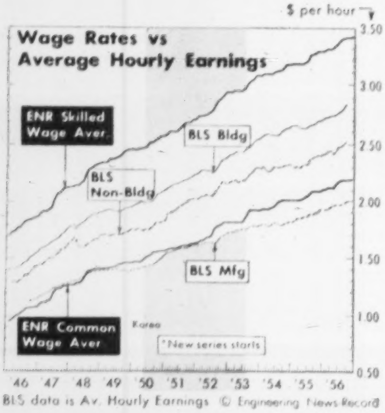

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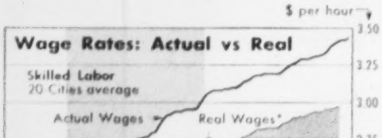

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Consumer Price Index

US Bu of Labor Statistics—1947-49 = 100

	1939#	1945#	1949#	1950#	1953*	1954*	1955*	1956*
Jan	59.6	76.1	102.7	100.6	113.9	115.2	114.3	114.6
Feb	59.4	76.0	101.6	100.4	113.4	115.0	114.3	114.6
Mar	59.3	76.0	101.9	100.7	113.6	114.8	114.3	114.7
Apr	59.2	76.1	102.1	100.8	113.7	114.6	114.2	114.9
May	59.1	76.7	101.8	101.3	114.0	115.0	114.2	115.4
Jun	59.0	77.3	102.0	101.8	114.5	115.1	114.4	116.2
Jul	59.2	77.5	101.4	102.9	114.7	115.2	114.7	117.0
Aug	59.0	77.5	101.6	103.7	115.0	115.0	114.5	116.8
Sept	60.2	77.2	102.1	104.4	115.2	114.7	114.9	117.1
Oct	60.0	77.2	101.5	105.0	115.4	114.5	114.9	....
Nov	59.9	77.5	101.6	105.5	115.0	114.6	115.0	....
Dec	59.6	77.8	101.0	106.9	114.9	114.3	114.7	....

Pre-depr. high: 77.0, Nov 1925 Depr. low: 53.6, Apr 1933.
* For details of latest revision see the February 53 Monthly Labor Review.
# Interim adjusted series converted form 1935 39 = 100 1947 49 = 100 base.

. . . Wage Pattern in '56

Common labor unions won a bigger hike this year in nine cities; smaller increases in four cities; the same in six cities. Bricklayers had larger wage hikes than last year in eight cities; smaller in four cities; same in three cities. Carpenters made out better than last year in eight cities but in seven cities they got the same increase as last year and in six cities they received a smaller increase. Ironworkers racked up larger increases in eight cities and raises equal to '55 in two cities, but in six cities they didn't do as well as '55.

• **Real wages rise**—After remaining stable for three years, living costs started to rise in the second quarter of this year (see table above.) By September the BLS Consumer Price Index rose 2.2% higher than the January value. Though, actual wage rates have risen about 4%, the net gain in real wages for 1956 is about 2%. This gain in real wages for common labor compares with annual gains of 4%-6% during '53-'55. For skilled workers, this year's 2% increase in real wages compares with yearly gains of 3%-5% in purchasing power during the three years 1953-55.

Construction Wages—ENR 20-Cities Averages

SKILLED LABOR, dollars per hour

(Bricklayer, carpenter, ironworker average)

	1926	1932	1939	1945	1946	1949	1950	1954	1955	1956
J	1.24	1.15	1.43	1.64	1.70	2.35	2.46	3.09	3.19	3.30
F	1.24	1.11	1.43	1.64	1.73	2.35	2.47	3.09	3.19	3.31
M	1.24	1.11	1.43	1.64	1.74	2.38	2.47	3.10	3.19	3.31
A	1.25	.95	1.44	1.65	1.76	2.38	2.48	3.10	3.19	3.32
M	1.26	.96	1.44	1.65	1.77	2.38	2.48	3.11	3.21	3.34
J	1.27	.99	1.44	1.66	1.80	2.39	2.52	3.13	3.23	3.37
J	1.27	1.00	1.44	1.66	1.82	2.41	2.52	3.14	3.25	3.39
A	1.28	.98	1.44	1.67	1.83	2.44	2.54	3.15	3.26	3.41
S	1.28	.99	1.44	1.67	1.84	2.45	2.55	3.17	3.27	3.42
O	1.29	.98	1.44	1.67	1.85	2.46	2.56	3.18	3.29	3.42
N	1.29	.97	1.46	1.68	1.86	2.46	2.57	3.18	3.29	3.43
D	1.29	.98	1.46	1.68	1.87	2.46	2.58	3.19	3.29	
Av	1.27	1.02	1.44	1.66	1.80	2.41	2.52	3.14	3.24	...

COMMON LABOR, dollars per hour

(Building and heavy construction average)

	1926	1932	1939	1945	1946	1949	1950	1954	1955	1956
J	.54	.45	.68	.89	.95	1.42	1.49	1.95	2.02	2.11
F	.54	.45	.68	.89	.97	1.42	1.49	1.95	2.02	2.12
M	.54	.44	.68	.89	.99	1.42	1.49	1.95	2.02	2.12
A	.54	.41	.68	.90	1.00	1.43	1.49	1.95	2.03	2.12
M	.55	.41	.68	.91	1.02	1.43	1.51	1.97	2.05	2.15
J	.55	.41	.68	.92	1.03	1.44	1.53	1.98	2.06	2.17
J	.55	.41	.68	.92	1.06	1.47	1.54	2.00	2.07	2.19
A	.56	.42	.69	.92	1.07	1.47	1.56	2.01	2.09	2.19
S	.56	.43	.69	.92	1.07	1.48	1.56	2.01	2.09	2.19
O	.55	.43	.69	.92	1.07	1.48	1.57	2.02	2.09	2.19
N	.56	.43	.69	.92	1.08	1.48	1.58	2.02	2.09	2.19
D	.56	.43	.69	.94	1.09	1.48	1.58	2.02	2.10	...
Av	.55	.43	.68	.91	1.03	1.45	1.53	1.98	2.06	...

Averages include fringe benefits see 1956 wage table by trades for each of 20 cities for nature and extent of these—welfare fund, pension fund and others.

Skilled and Common Wages in 21 Cities

ENR 21-Cities	Hrs per day	Bricklayers 1955 Low	Aver	High	Carpenters 1955 Low	Aver	High	Structural Ironworkers 1955 Low	Aver	High	Common labor (Av bldg & heavy constr) Low	Aver	High
Atlanta	8	$3.10	$3.162	$3.25	$2.50	$2.55	$2.60	$2.85	$2.892	$2.95	$1.33	$1.351	$1.38
Baltimore	8	3.20a	3.20	3.20a	2.75	2.779	2.925	3.325d	3.325	3.325d	1.675d	1.675	1.675d
Birmingham	8	3.25	3.312	3.50	2.50	2.533	2.60	2.925c	2.944	3.00c	1.425	1.433	1.50
Boston	8	3.185b	3.295	3.35b	2.75	2.867	2.925d	3.325d	3.40	3.475d	2.14p	2.20	2.22p
Chicago	8	3.55c	3.569	3.625c	3.30b	3.319	3.375b	3.40c	3.458	3.50c	2.50c	2.519	2.575c
Cincinnati	8	3.325	3.373	3.45	3.075	3.113	3.15	3.19c	3.24	3.275c	2.07	2.117	2.15
Cleveland	8	3.375d	3.419	3.45d	3.325i	3.363	3.40	3.325d	3.363	3.40d	2.575	2.613	2.65
Dallas	8	3.50	3.552	3.625	2.75	2.792	2.875	2.875	2.906	2.95	1.45	1.475	1.50
Denver	8	3.50	3.50	3.50	2.85	2.908	2.975d	2.85	2.906	2.975c	1.875	1.90	1.925
Detroit	8	3.45be	3.526	3.58be	3.21bj	3.277	3.324m	3.35a	3.423	3.475a	2.245b	2.517	2.55b
Kansas City	8	3.625	3.625	3.625	2.75	2.808	2.85	2.90	2.958	3.00	2.042	2.092	2.117
Los Angeles	8	3.40	3.50	3.60	2.825k	2.919	3.00a	3.175c	3.225	3.325c	2.15d	2.203	2.275d
Minneapolis	8	3.225	3.292	3.325	2.80	2.867	2.90	2.97	3.037	3.07	2.05	2.117	2.15
New Orleans	8	3.10	3.15	3.175	2.52	2.573	2.60	2.90k	2.95	2.975k	1.425	1.458	1.475
New York	7	4.15f	4.15	4.15f	3.57l	3.637	3.73l	3.975#n	4.017#	4.075#n	2.415#l	2.489#	2.592 #q
Philadelphia	8	3.92g	3.92	3.92g	3.20	3.258	3.30	3.63o	3.655	3.73o	2.10	2.144	2.175
Pittsburgh	8	3.625c	3.65	3.725c	3.20c	3.244	3.275c	3.225c	3.283	3.375c	2.04d	2.081	2.128d
St. Louis	8	3.62ch	3.623	3.625ch	3.125c	3.192	3.225c	3.10c	3.183	3.225c	2.175d	2.242	2.275d
San Francisco	8	3.65*b	3.70*	3.75*b	2.98c	3.078	3.16b	3.175c	3.233	3.35b	2.15d	2.238	2.275b
Seattle	8	3.40a	3.442	3.50a	2.75a	2.759	2.76a	2.95a	3.01	3.07a	2.35a	2.35	2.35a
Montreal, Can	8	2.00	2.025	2.10	1.80	1.825	1.90	1.90	1.925	2.00	1.25	1.263	1.30

* 7 hr. day # 8 hr. day •a includes 10¢ H&W •b incl. 10¢ WF •c incl 7½¢ WF •d incl 7½¢ H&WF •e incl 10¢ VF •f incl 4% W, 20¢ P •g incl 17¢ WF •h incl 3% VF •i incl 5¢ tool replacement •j incl 2% VF •k incl 5¢ WF •l incl 5% W, 6 PH •m incl 10¢ ins., 4% VF •n incl 3% WF, 3% PF •o incl 10½¢ WF, 7½¢ PF •p incl 7¢ H&W •q incl 5% WF, 3% PF

Wage Rates Including Benefits—New York City

Dollars per hour

Year	Carpenters	Bricklayers	Masons' Laborers	Common Laborers	Structural Ironwkrs
1874	$0 23 (10 hrs.)	$0 43 (8 hrs.)	$0 18 (8 hrs.)	$0 14 (10 hrs.)	
1890	0 43 (8 hrs.)	0 47 (8 hrs.)	0 28 (8 hrs.)	0 14 (9 hrs.)	
1907	0 63	0 70	0 38	0 22 (8 hrs.)	$0 60 (8 hrs.)
1913	0 63	0 70	0 38	0 23	0 63
1930	1 65	1 93	1 03	1 03	1 93
1932	1 33 (7 hrs.)	1 47 (7 hrs.)	1 00 (7 hrs.)	0 65	1 68
1938	1 75	1 89	1 00	0 91	1 93
1939	1 75	1 89	1 03	0 91	1 93
1942	1 85	2 00	1 03	0 95	2 00
1946	2 10	2 25	1 23	1 20	2 25
1947	2 47	2 65	1 44	1 44	2 56
1948	2 73	2 94	1 62	1 63	2 98
1949	2 75	3 20	1 70	1 70	3 00
1950	2 88*	3 30*	1 802*	1 802*	3 14*
1951	3 09*	3 548*	1 957*	1 957*	3 348*
1952	3 152*	3 674*	2 021*	2 021*	3 411*
1953	3 335*	3 858*	2 184*	2 184*	3 591*
1954	3 57*	4 033*	2 415*	2 415*	3 975*
1955	3 637*	4 15*	2 489*	2 489*	4 017*

* Incl benefits after Sept. 1950

- NYC workers get these benefits under new 1956 wage contracts. For benefits under previous contract see page 149, Sept. 29, 1955.
- **WELFARE**: 5% carpenters**, common labor**, roofers**, waterproofers, tractor operator**, shovel operator**; 4% bricklayers, reinforcing ironworkers*, cement finishers*, lathers*, hoisting engineers*; 3% structural ironworkers**, mosaic & terrazzo†, glaziers†, steamfitters**; 3% + 10¢ hr sheet metal workers**; 15¢ hr plasterers; 5% welfare and pension, 1% national contribution, $4.00 per day annuity contribution, 2% SS, 1% joint industry board assessment electricians; 12% + 10¢ hr fringe benefits plumbers; 8% fringe benefits tile layers, painters; 10¢ security fund waterproofers; 1% education fund steamfitters.

Also †5% pension; *4% pension; **3% pension

- **PENSION**: 20¢ hr bricklayers; 5%, 4%, 3% see welfare; 15¢ hr plasterers
- **BENEFIT FUND**: 20¢ hr plasterers; 3% waterproofers
- **VACATION FUND**: 4% electricians; 2% steamfitters, sheet metal workers
- **PAID HOLIDAYS**: 6 ea carpenters, electricians, hoisting engineers
- **COST OF LIVING ESCALATORS**: most trades
- **CONTRACT STATUS**: carpenters, reinforcing ironworkers, common labor, cement finishers, lathers, glaziers, plumbers, roofers, waterproofers, sheet metal workers, hoisting engineers, mosaic & terrazzo, steamfitters, shovel operators, expire 6 30 57; bricklayers, 5 31 58; structural ironworkers, 6 30 58; electricians, 12 31 57.

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PB-6 **58 lb.** **Middle-Weight Breaker and Spike Driver** A heavy-duty machine for easy handling on less strenuous breaking or trenching jobs and horizontal demolition work.	T T	T T T T	T T T T T T	T T T T T T T T T T T
PB-59 **40 lb.** **Light-Weight Breaker and Digger** Ideal weight and power for scaffolding jobs—industrial applications and trench work.	T T T	T T T T T T	T T T T T T T T	T T T T T T T T T T T T T T T
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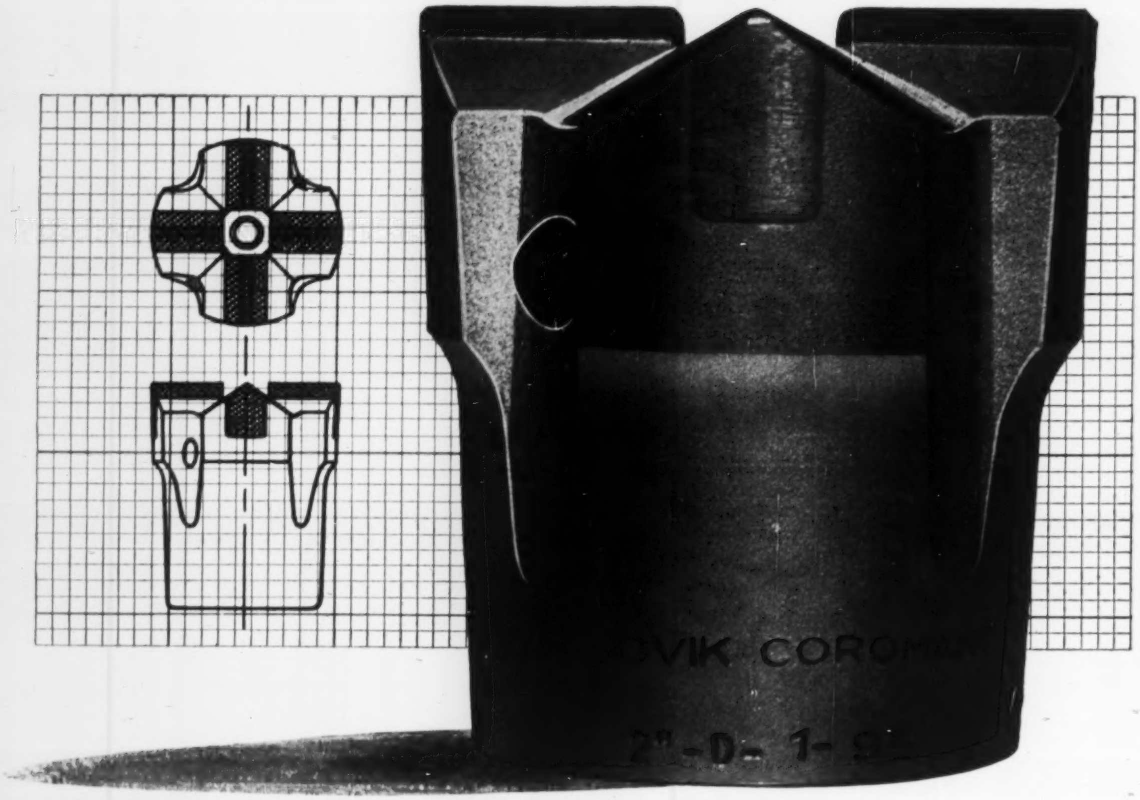
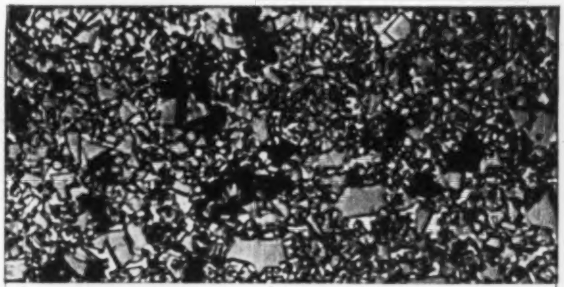
THIS ROCK BIT IS PRECISION-MADE FOR A HIGHER PERFORMANCE



Nothing tougher and more wear-resistant than the insert of a Sandvik Coromant 776 bit

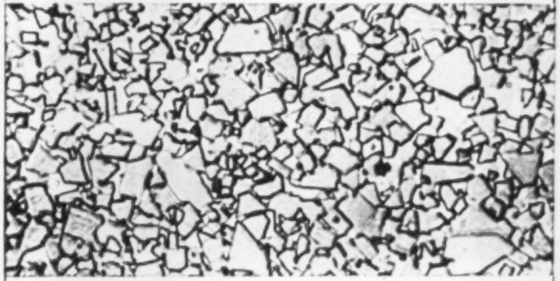
Rock bits that go on *and on* must have highest-grade tungsten-carbide inserts. Nothing but tungsten carbide in its purest state is good enough, will last as long. That's why the carbide that goes into a Sandvik Coromant 776 bit is meticulously controlled.

Sandvik, the world's largest manufacturers of brazed-in tungsten-carbide inserts for rock drilling, control every phase of production. Coromant carbide is scrutinised for impurities from the very first stages of processing the tungsten ore, right through to the final inserts. Add to that Sandvik's special process of securing the insert to the body, employing an exceptionally strong bonding metal, and you know why a Coromant 776 bit lasts longer. In 1955, one billion feet were drilled with these inserts, all fitted to Sandvik Coromant bits or integral steels. *Nothing is more conclusive of the quality of Coromant bits than this figure.*



LOW QUALITY TUNGSTEN CARBIDE

These are unretouched, 1200-times enlarged microphotos. Above, carbide full of impurities. Those black marks are contaminations which are present when production and quality control are deficient. Contamination of this kind weakens the carbide and reduces its working life.



SANDVIK COROMANT TUNGSTEN CARBIDE

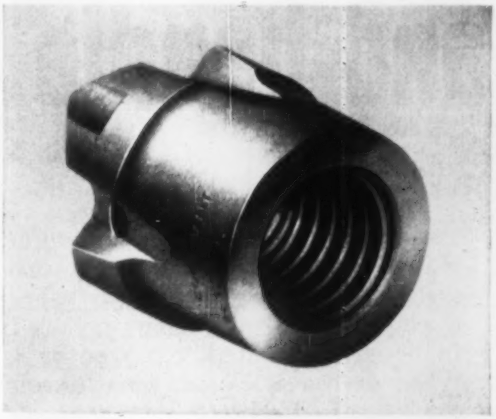
This is Coromant carbide. Notice the uniformity of size and the even distribution of grain. Coromant inserts are free of dangerous porosity and impurities—the reason they go further, have greater strength.

Nothing stands the strain like the Swedish body of a Sandvik Coromant bit

When you put the strongest possible tungsten carbide into a rock bit, the body has to be the strongest available to take the extra strain. That's why Coromant bodies are made of high-quality Swedish alloy steel. But that's not all. Inserts and clearance are cylindrically-ground and the insert ends precision-tooled to exactly the same height. This means *smoother* drilling and *smoother* holes, because the load is equally distributed on all four inserts. *Precision engineering such as this give Coromant bits a longer life!*

Nothing fits like the precision-milled threads of a Sandvik Coromant bit

In order to get a smooth profile of the highest accuracy, Coromant threads are precision-milled in a special thread-milling machine and not made with a tap. Precision-milling too protects the skirt from common fatigue failures.



SANDVIK COROMANT 776 BITS

and Sandvik Coromant integral steels are available in standard sizes through Atlas Copco, who, in their own field, are the world's largest manufacturers of rock drills. Contact any of these offices *today* for further information and a demonstration.

U.S., Atlas Copco Pacific, Inc., 930 Brittan Avenue, San Carlos, California. Atlas Copco Eastern Inc., P.O. Box 2568, Paterson 25, N.J.
CANADA, Atlas Copco Canada Ltd., Montreal, Airport, P.Q.
MEXICO, Atlas Copco Mexicana S.A., Apartado Postal 56, Torreon, Coahuila.

Atlas Copco

Manufacturers of Stationary and Portable Compressors, Rock-Drilling Equipment, Loaders, Pneumatic Tools and Paint-Spraying Equipment

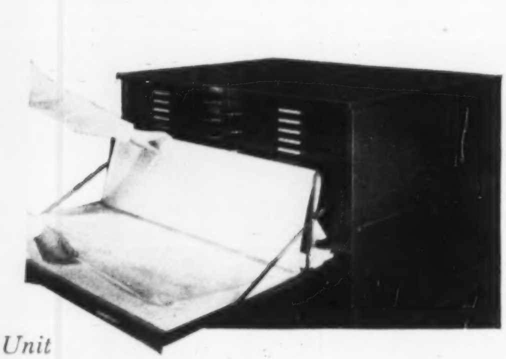
You'll get more work done...

Auto-Shift Table

The man at the Auto-Shift produces more. Two finger-tip controls adjust board height and slope so easily that working position can be frequently changed—board can be instantly, effortlessly shifted to most convenient and comfortable position. Work is shifted to draftsman—draftsman never reaches for work.

and handle it better...with

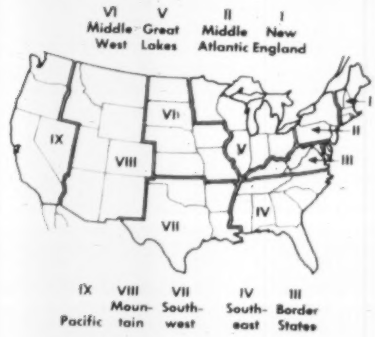
The tracing you want is *always on top* in a Hamilton Shallow-Drawer unit. An exclusive Hamilton *tracing lifter* supports all tracings filed above—permits any one tracing to be easily located, removed or refiled. When drawer is closed, same *tracing lifter* compresses all sheets—keeps them flat and wrinkle-free.

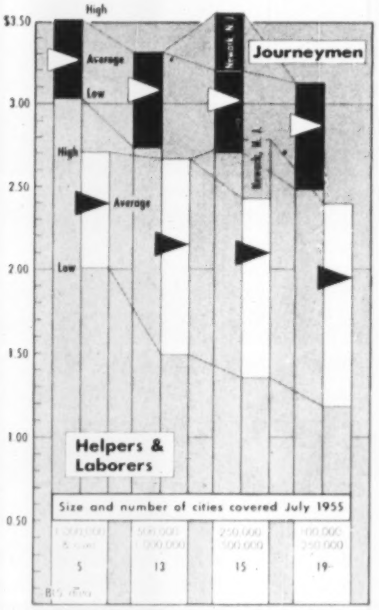


Shallow-Drawer Unit

Hamilton Drafting Equipment

HAMILTON MANUFACTURING COMPANY • TWO RIVERS, WISCONSIN





Average Union Wages, Building Trades, by Area

Bureau of Labor Statistics, July 1, 1955

Trade	United States	I New England	II Middle Atlantic	III Border States	IV Southeast	V Great Lakes	VI Middle West	VII Southwest	VIII Mountain	IX Pacific
All building trades	$2.90	$2.71	$3.16	$2.72	$2.40	$3.01	$2.88	$2.57	$2.61	$2.85
Journeymen	3.09	2.93	3.37	3.01	2.71	3.16	3.03	2.83	2.83	2.96
Asbestos workers	3.17	3.01	3.42	3.10	2.89	3.20	3.14	3.06	2.93	3.16
Boilermakers	3.22	3.08	3.60	3.05	2.98	3.23	3.04	2.98	3.08	3.13
Bricklayers	3.48	3.22	3.71	3.34	3.17	3.42	3.47	3.44	3.30	3.49
Carpenters	3.01	2.74	3.38	2.93	2.52	3.13	2.94	2.68	2.75	2.83
Cement finishers	2.98	3.13	3.36	2.81	2.42	3.05	3.00	2.58	2.78	2.81
Electricians (inside wiremen)	3.17	2.98	3.34	3.13	2.92	3.24	3.16	3.01	2.93	3.13
Elevator constructors	3.22	3.13	3.44	3.23	2.94	3.23	3.14	3.08	3.08	3.20
Glaziers	2.77	2.59	3.06	2.75	2.25	2.96	2.90	2.44	2.42	2.65
Lathers	3.29	3.05	3.42	3.19	2.74	3.26	3.17	3.20	3.23	3.36
Machinists	3.22	3.00	3.57	3.09	2.75	3.23	3.10	2.96	2.85	2.98
Marble setters	3.14	3.12	3.22	3.23	3.05	3.18	3.16	2.93	2.85	3.03
Mosaic and terrazzo workers	3.11	3.11	3.28	3.04	2.90	3.11	3.22	2.75	3.11	3.07
Painters	2.90	2.59	2.98	2.72	2.49	3.00	2.82	2.59	2.57	2.93
Paperhangers	2.81	2.75	2.65	2.24	2.56	2.94	2.82	2.43	2.56	2.94
Pipefitters	3.20	3.05	3.45	2.98	2.92	3.23	3.21	3.05	2.99	3.18
Plasterers	3.36	3.21	3.64	3.24	2.74	3.29	3.18	3.16	3.24	3.44
Plumbers	3.21	3.05	3.40	3.04	2.99	3.20	3.21	3.04	2.97	3.22
Rodmen	3.03	3.43	3.43	3.01	2.67	3.16	2.96	2.67	2.82	2.80
Roofers, composition	2.84	2.87	3.25	3.27	2.11	3.01	2.73	2.17	2.87	2.78
Roofers, slate and tile	2.94	3.13	3.16	3.03	2.23	3.22	2.77	2.46	2.60	2.82
Sheet-metal workers	3.06	3.00	3.37	2.98	2.70	3.10	3.10	2.81	2.82	3.01
Stonemasons	3.35	3.24	3.37	3.32	3.17	3.29	3.36	3.45	3.50	3.56
Structural-iron workers	3.20	3.44	3.45	3.24	2.80	3.23	3.03	2.88	2.82	3.04
Tile layers	3.11	3.18	3.27	3.03	2.83	3.15	3.05	2.83	2.81	3.11
Helpers and laborers	2.16	2.09	2.38	1.86	1.47	2.36	2.20	1.49	2.00	2.25
Bricklayers' tenders	2.31	2.10	2.55	1.75	1.35	2.41	2.33	1.56	2.34	2.55
Building laborers	2.07	2.06	2.22	1.86	1.48	2.33	2.12	1.43	1.91	2.17
Composition roofers' helpers	1.96	2.11	2.09	1.90	1.41	2.08	2.10	1.53		2.10
Elevator constructors' helpers	2.30	2.20	2.54	2.26	2.06	2.26	2.24	2.17	2.17	2.23
Marble setters' helpers	2.35	2.27	2.62	2.23	1.43	2.43	2.17	1.63	2.15	2.35
Plasterers' laborers	2.45	2.24	2.67	1.95	1.44	2.52	2.56	1.73	2.35	3.06
Plumbers' laborers	2.18		2.30	1.83	1.35	2.43	2.39	1.31	2.11	2.27
Terrazzo workers' helpers	2.45	2.31	2.61	2.10	1.43	2.51	2.37	1.67	2.04	2.53
Tile layers' helpers	2.37	2.31	2.59	2.19	1.43	2.44	2.14	1.56	2.15	2.35

Average Hourly Earnings on Contract Construction

Bureau of Labor Statistics, dollars per hour

	Building*							Non building*							Manufacturing						
	1946	1949	1950	1953	1954	1955	1956	1946	1949	1950	1953	1954	1955	1956	1946	1949	1950	1953	1954	1955	1956
Jan.	$1.40	$1.92	$1.98	$2.41	$2.58	$2.65	$2.74	$1.30	$1.71	$1.75	$2.18	$2.33	$2.31	$2.42	$1.00	$1.41	$1.42	$1.74	$1.80	$1.84	$1.93
Feb	1.42	1.93	1.99	2.42	2.59	2.65	2.74	1.30	1.71	1.77	2.19	2.29	2.33	2.44	1.00	1.40	1.42	1.74	1.80	1.85	1.93
Mar.	1.41	1.93	2.00	2.44	2.59	2.63	2.75	1.28	1.70	1.77	2.20	2.27	2.31	2.45	1.04	1.40	1.42	1.75	1.79	1.85	1.95
Apr.	1.42	1.93	1.99	2.44	2.58	2.63	2.75	1.31	1.71	1.75	2.18	2.2[illegible]	2.34	2.42	1.06	1.40	1.43	1.75	1.80	1.86	1.96
May	1.43	1.93	2.00	2.44	2.58	2.63	2.76	1.31	1.71	1.76	2.19	2.32	2.34	2.44	1.07	1.40	1.44	1.76	1.81	1.87	1.97
June	1.44	1.92	2.00	2.44	2.58	2.64	2.78	1.31	1.70	1.76	2.19	2.31	2.34	2.48	1.08	1.41	1.45	1.77	1.81	1.87	1.97
July	1.47	1.92	2.01	2.47	2.58	2.66	2.79	1.36	1.71	1.78	2.22	2.31	2.36	2.49	1.09	1.41	1.46	1.77	1.80	1.89	1.97
Aug	1.48	1.93	2.02	2.49	2.60	2.67		1.35	1.71	1.79	2.26	2.32	2.38		1.11	1.40	1.46	1.77	1.79	1.88	
Sept	1.51	1.94	2.07	2.52	2.62	2.68	...	1.37	1.73	1.83	2.28	2.33	2.39		1.13	1.41	1.48	1.79	1.81	1.90	
Oct.	1.53	1.94	2.08	2.54	2.63	2.70	...	1.40	1.74	1.83	2.31	2.33	2.40		1.14	1.39	1.50	1.79	1.81	1.91	
Nov.	1.55	1.95	2.09	2.55	2.63	2.71	...	1.43	1.75	1.84	2.31	2.34	2.40		1.15	1.39	1.51	1.79	1.83	1.93	
Dec.	1.57	1.96	2.12	2.57	2.65	2.72	...	1.43	1.78	1.88	2.30	2.33	2.41		1.16	1.41	1.54	1.80	1.83	1.93	

* Series revised March, 1948 to cover both public and private contract construction and to include workers engaged in off-sit operations for construction as well as site workers.

Work Injuries Rise

The construction industry suffered an increase in disabling work injuries during 1955, which rose to a rate of 34.5 per million employee-hours worked. This was 7.5% above 1954's rate of 32.1 and marked the reversal of a four-year decline 1950-54. But 1955 was still below the high injury rates in 1950-52.

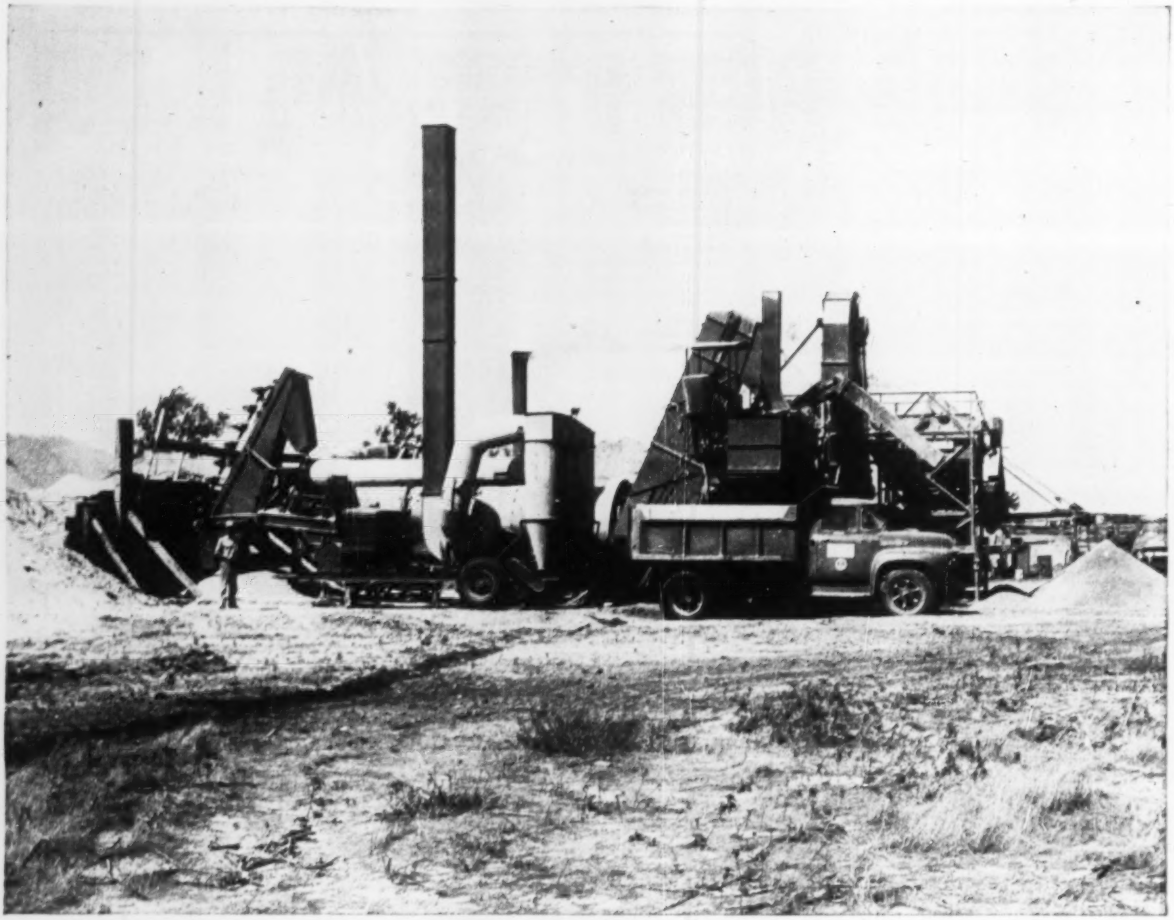
Because of changes in the method of computing time-charge evaluations for permanent-partial impairments, 1955 injury-severity rates and average days lost aren't strictly comparable with '54 or prior years. However, the figures indicate a lower severity rate in '55 than in '54.

Work Injury Rates in Construction, 1954-1955

Bureau of Labor Statistics

	Number of establishments reporting		Injury frequency[a]		Severity rate[b]		Average days lost[d]			1955 Injuries resulting in		1954 Injuries resulting in		
	1955	1954	1955	1954	1955	1954	1955	1954	Death	Perm impair[e]	Temp total	Perm total[c]	Perm part	Temp total
Contract construction	6,008	5,004	34.5	32.1	2.76	3.6	89	130	0.8	2.9	96.3	1.2	3.1	95.7
General building contractors	2,091	1,642	39.8	37.0	2.49	3.6	60	96	0.4	2.8	96.8	0.7	2.9	96.4
Heavy construction	318	289	30.1	27.8	4.41	5.3	148	189	1.6	4.4	94.0	1.9	4.8	94.9
Highway & street	521	498	37.5	35.0	4.88	5.6	130	161	1.5	2.5	96.0	1.4	3.7	93.3
Special-trade contractors	3,078	2,575	31.1	28.8	2.26	2.8	75	114	0.6	2.5	96.9	1.2	1.9	96.9
Plumb, heat, air cond	799	667	28.0	26.2	1.50	0.9	53	33	0.4	2.2	97.4	0.3	0.5	99.2
Painting & decorating	305	337	24.6	22.2	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Electrical	453	339	28.0	21.1	1.09	2.0	39	93	0.2	2.1	97.7	0.5	2.2	97.3
Masonry, stonework, tile setting & plastering	557	353	34.5	29.3	1.06	1.3	31	46	0.1	1.6	98.3	0.3	1.0	98.7
Roofing & sheet-metal	296	241	48.6	37.8	4.68	5.5	96	145	0.8	3.4	95.8	1.6	1.8	96.6
Structural steel erection	74	58	41.2	47.5	n.a.	12.1	n.a.	255	n.a.	n.a.	n.a.	2.9	4.7	92.4
Misc. spec-trade contractors	594	580	28.9	33.2	1.93	2.7	58	92	0.3	2.6	97.1	1.0	1.8	97.2

[a] average number of disabling work injuries per million employee-hours worked [b] average number of days lost for each 1,000 employee-hours worked; because of changes in method of computing time-charge evaluations for permanent-partial impairments, the 1955 injury-severity rates and average days lost or charged per case are not strictly comparable with previous years. [c] permanent, including death [d] charged to each case [e] includes permanent-total and permanent-partial impairments; in 1954 and previous years, permanent-total impairments (relatively few in number) were included with deaths



George M. Myers, Kansas contractor, reports:

"Our Barber-Greene Asphalt Plant averages 900 tons daily"*

This is the output of Mr. Myers' plant at its 21st location.

Changing job sites 21 times is a good record for any asphalt plant, but it is not unusual in a Barber-Greene Model 845. Even among Barber-Greene plants, the 845 is outstanding. It was specifically developed to achieve the utmost in portability and should not be confused with any other continuous plant. The dryer includes the hot elevator on the same chassis . . . the mixer has two-bin gradation unit included—these and other features contribute to its superior portability and performance.

Mr. Myers continues:

"We frequently move 100 miles or more . . . deliver an average of 80 tons per hour* . . . maintenance to date has been routine . . . repair minor . . . operating costs low . . . with reasonable care there should be no limit to the life of our plant."

Like all Barber-Greene Continuous Plants, the Model 845 is inherently automatic as a result of the aggregate and bitumen feed being interlocked. The human element is removed, assuring uniform mix quality.

Barber-Greene offers a complete line of both continuous and BatchOmatic plants in any capacity to suit your needs. Write for full information.

*Rated capacity is 60-90 tons per hour.

56-26-A

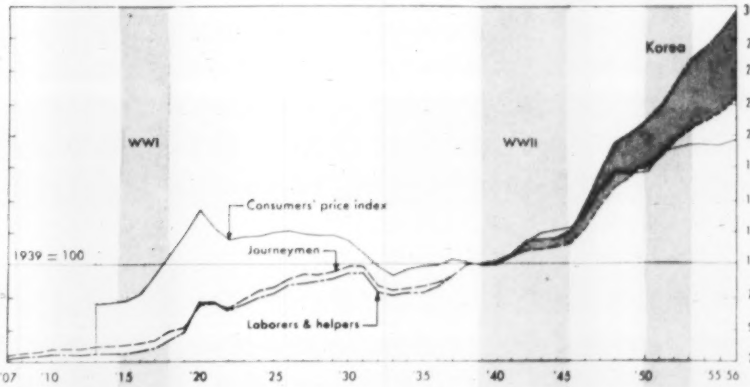
Barber-Greene BG

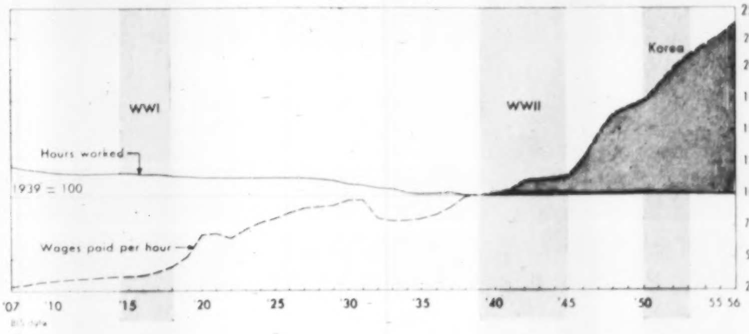
AURORA, ILLINOIS, U.S.A.

CONVEYORS . . . LOADERS . . . DITCHERS . . . ASPHALT PAVING EQUIPMENT

Union Base Rates Up 4.6%

Union base wage rates, excluding fringe benefits, rose 4.6% in the building trades between July 1, '55 and July 1, '56, according to the Labor Department's Bureau of Labor Statistics Index. This compares with a 3.5% average rise during the preceding 12 months. Rates for laborers and helpers increased 6% on the average during '55-'56; journeymen, up 4.4%.

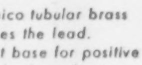




Union Labor Trends, US Bu of Labor Statistics

Year	All Building Trades	Journeymen	Helpers & Laborers	Bricklayers	Carpenters	Cement Finishers	Electricians Inside Wiring	Glaziers	Lathers	Painters	Plasterers	Plumbers & Gas Fitters	Sheet Meta Workers	Steam & Sprinkl Fitrs	Stonemasons	Structural Ironworkers	Building Laborers	Bricklayers' Tenders
Wage rates per hour—Index, 1939 = 100																		
1907M	29.3	29.7	27.3	37.7	29.8	34.5	27.9			26.2	37.3	33.3	30.6	30.1	33.9	27.9	30.8	30.3
1913M	36.1	36.9	31.8	41.5	36.8	38.0	33.8		34.6	35.5	39.3	37.9	35.6	35.0	36.7	37.3	34.2	31.8
1926M	88.3	88.7	84.9	94.1	88.5	86.6	81.5	86.7	83.9	90.9	92.4	83.9	86.3	84.9	92.7	81.1	86.9	85.5
1930M	97.0	97.5	93.3	101.8	96.9	95.4	90.9	92.6	89.6	100.6	98.1	91.5	94.7	93.5	99.1	92.5	92.9	91.9
1932M	83.1	83.6	79.2	87.0	79.6	83.6	87.9	78.0	81.0	85.3	81.4	80.5	83.4	81.0	88.4	81.0	78.7	78.4
1938J	99.3	99.3	99.2	99.5	99.8	99.6	99.5	99.3	96.8	99.2	99.2	99.1	98.6	99.3	99.7	98.9	99.4	99.7
1942	111.9	110.9	117.5	108.3	112.1	110.8	113.5	108.8	109.1	110.5	105.0	110.5	116.0	109.3	108.0	108.7	119.6	115.7
1946	129.3	126.8	146.3	125.6	129.7	128.2	124.9	123.4	124.2	127.3	119.0	123.2	133.0	124.6	126.5	121.4	152.2	141.7
1948	163.5	159.4	192.7	165.6	164.7	161.1	154.4	155.5	157.8	154.4	148.2	158.2	164.4	154.3	166.0	151.9	200.8	185.5
1949	170.3	166.1	199.8	174.0	169.1	165.8	168.1	160.5	164.2	162.1	161.9	162.8	169.6	161.3	175.7	157.4	208.4	190.4
1950	177.8	173.2	210.8	180.4	177.4	172.7	172.3	169.4	179.6	167.7	169.3	166.7	177.9	168.3	187.1	164.8	220.0	203.4
1951	189.1	184.0	225.3	188.0	189.1	183.7	185.4	177.8	188.0	178.7	177.5	176.6	188.1	178.6	193.6	175.7	235.6	213.9
1952	200.8	195.3	241.0	203.9	200.6	192.2	196.0	186.0	194.4	190.2	187.6	187.0	202.2	189.1	207.5	184.0	251.7	228.0
1953	211.2	204.9	256.6	210.0	211.1	203.8	204.0	199.1	203.4	199.5	194.8	193.8	211.5	197.9	210.9	194.5	270.8	240.0
1954	218.9	212.2	267.7	216.8	217.9	209.7	210.0	204.9	208.7	205.7	198.4	204.5	221.5	208.5	215.7	201.3	282.6	250.4
1955	226.6	219.4	279.1	222.6	225.9	217.9	214.8	214.0	214.2	213.9	204.3	209.4	230.0	213.5	222.1	208.9	295.3	260.6
1956	237.1	229.2	295.9	232.6	235.4	228.4	226.6	225.2	223.3	222.5	212.1	218.7	240.4	223.3	232.1	217.7	312.4	281.2
Hours worked per week—Index, 1939 = 100																		
1907M	124.3	123.8	126.1	122.9	121.0	122.7	124.2			133.1	125.8	120.6	117.0	120.3	118.4	121.3	121.6	118.9
1913M	118.2	118.0	118.3	114.9	115.6	119.8	120.7		121.8	125.9	124.3	119.2	114.9	118.0	115.7	114.1	118.3	116.0
1926M	114.9	115.1	113.9	113.3	113.5	113.4	115.9	117.5	118.9	120.7	118.2	116.5	111.8	114.4	114.5	112.8	112.1	113.9
1930M	109.8	110.0	109.0	107.1	109.4	108.1	109.9	112.4	110.4	115.4	113.0	109.9	106.9	108.5	107.1	108.8	119.0	106.9
1932M	106.5	106.6	105.7	103.1	105.0	105.6	106.2	107.9	109.3	114.2	110.1	108.0	103.6	106.4	104.8	104.8	104.9	104.0
1938J	100.2	100.1	100.2	99.0	100.0	100.0	100.2	100.2	100.8	110.4	100.0	99.7	100.0	99.6	100.1	100.1	100.1	100.3
1942	101.1	101.8	98.8	100.8	101.8	100.6	104.5	102.0	102.5	106.5	102.0	99.9	100.9	102.2	100.2	101.1	98.8	98.6
1946	100.2	101.1	97.5	100.3	103.3	100.4	100.4	102.0	102.2	106.1	104.1	98.3	100.8	101.3	100.0	101.1	97.2	96.9
1948	100.1	101.0	97.4	100.5	100.2	100.0	100.4	103.5	98.1	106.2	102.9	97.6	100.1	101.3	101.0	101.1	97.2	96.4
1949	100.2	101.1	97.4	100.1	100.2	100.0	102.1	103.5	98.1	106.2	103.5	97.6	99.9	101.3	100.8	101.1	97.2	96.4
1950	100.3	101.2	97.4	100.1	100.2	100.0	102.1	103.5	100.2	106.2	105.9	98.2	99.9	101.3	100.8	101.1	97.2	96.4
1951	100.2	101.1	97.3	100.2	100.2	100.0	102.1	103.5	100.2	104.9	105.9	98.2	99.9	101.3	100.9	101.1	97.0	96.2
1952	100.2	101.1	97.5	100.2	100.2	100.0	101.1	103.5	100.2	104.9	105.9	98.2	99.9	101.3	100.9	101.1	97.1	95.3
1953	100.2	101.1	97.5	100.2	100.2	100.0	101.1	103.5	100.3	104.9	105.9	98.2	99.9	101.3	100.9	101.1	97.1	96.3
1954	100.2	101.1	97.5	100.2	100.2	100.0	101.1	103.5	99.8	104.9	105.9	98.2	99.9	101.3	100.9	101.1	97.1	96.3
1955	100.2	101.1	97.5	100.2	100.2	100.0	101.1	103.5	99.8	104.9	105.9	98.2	99.9	101.3	100.9	101.1	97.1	96.2

•M May 1. •J June 1. •All others July 1.


Details on a
BETTER
PENCIL
(MARS TECHNICO with
Mars Lumograph lead)

Mars Technico clutch mechanism, made of brass for longer life. Noiseless, smooth working, almost frictionless. Serrated to lock lead in place. Grips 0.3" of lead.

Brass tip, 6 bands of serrations prevent slipping.

Mars-Lumograph lead, ribbed to hold securely. Does not flake or smudge; so opaque, inking-in is unnecessary.

Balance point, located 2.7" from tip for perfect pencil balance.

Mars Technico tubular brass insert, houses the lead. Threaded at base for positive locking of clutch mechanism in place.

Housing, kiln-dried cedar for light-but-sturdy construction.

Total weight only .47 oz.

Spring, 2" long, made of fine steel for proper tension control of clutch mechanism.

Mars Technico push button, for instantaneous release or adjustment of lead, with brass lead-sharpener, recessed in push button, easily removable. Keeps lead sharpened without spreading graphite dust in work area.

Mars-Lumograph lead, finest graphite meticulously graded from EXB to 9H (18 degrees) for better reproduction

Unique brass cap at top, prevents lead from falling out when clutch mechanism is released

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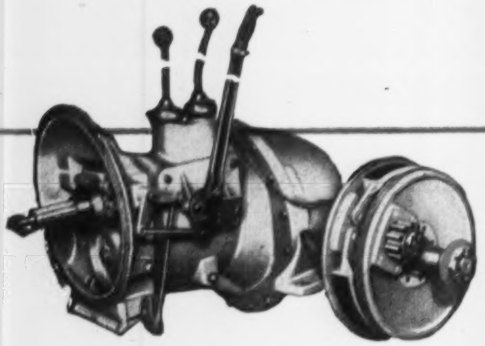
Base Rates on Compensation Insurance for Construction

Herbert L. Jamison & Co., Insurance Advisers and Auditors, New York, N. Y.—(Base rates in effect July 1, 1956—subject to increase or decrease according to experience ratings)

Classification of work	Ala.	Alas.	Ariz.	Ark.	Calif.	Colo.	Conn.	Del.	D. C.	Fla.	Ga.	Idaho	Ill.	Ind.	Iowa	Kans.	Ky.	La.	Me.	Md.	Mass.	Mich.	Minn.	Miss.	Mo.
Carpentry 1 2 Family Residences	$1.42	$3.47	$3.34	$2.55	$2.50	$1.88	$3.17	$1.50	$1.86	$2.71	$2.09	$2.83	$2.19	$1.71	$1.43	$2.08	$1.51	$4.28	$1.53	$2.11	$3.58	$2.65	$2.60	$2.38	$1.68
Carpentry 3 stories or less	1.42	3.95	3.34	2.75	4.88	2.51	4.17	1.50	2.32	2.71	2.09	2.83	2.83	1.93	1.94	2.16	1.51	4.72	1.53	2.11	4.73	2.65	2.60	2.64	2.08
Carpentry Interior trim, cabinet work	.71	2.34	3.34	1.45	4.88	1.17	2.45	1.50	1.79	2.10	1.12	1.42	1.48	.94	.86	1.24	.88	2.31	.68	1.56	1.71	1.44	2.60	1.90	2.53
Carpentry General	2.01	7.94	3.34	4.08	4.88	3.12	5.38	1.50	2.78	4.27	3.40	6.37	4.29	2.49	2.45	3.80	2.16	5.74	1.70	3.38	8.60	2.65	3.55	5.59	2.92
Chimney Construction, brick, concrete	5.21	12.22	7.89	10.17	13.25	8.68	16.05	A	12.25	12.33	7.96	12.08	9.61	7.18	5.64	10.14	7.48	16.92	4.54	10.52	6.29	9.18	11.57	13.14	12.80
Concrete Work Bridges Culverts C	3.02	A	6.05	4.30	4.95	4.79	7.98	1.65	7.26	4.33	3.85	6.38	3.99	3.05	3.73	3.80	3.00	6.11	3.48	4.64	6.34	3.95	6.30	6.90	4.31
Concrete Work 3 stories or less	1.01	6.75	2.94	1.28	1.02	1.41	3.74	1.65	3.21	2.49	.94	2.30	1.42	1.08	1.14	1.50	1.05	2.40	1.27	1.80	4.73	1.38	2.04	1.67	1.66
Concrete Work General	1.85	7.14	2.94	2.49	2.99	3.10	6.29	1.65	3.46	3.35	2.59	3.13	2.92	1.99	1.77	3.58	1.55	4.81	1.73	2.78	8.16	1.83	3.30	2.68	3.54
Concrete or Cement Walks, Floors	.68	2.76	2.94	1.33	1.17	1.24	3.39	1.65	1.41	2.44	1.57	1.76	1.43	.96	1.13	2.06	.95	2.61	.85	2.67	2.36	1.03	1.47	1.84	1.59
Electrical Wiring	.88	1.83	2.11	1.63	1.74	1.34	2.00	6.00	1.38	1.44	1.15	1.61	1.36	1.05	.96	1.42	.89	1.70	.74	1.59	1.85	1.06	1.15	1.56	1.29
Excavation Earth D	1.70	3.82	2.94	3.50	2.19	3.52	5.38	2.20	2.94	2.39	2.36	4.77	2.89	1.86	1.91	3.77	1.52	3.57	1.92	2.93	4.38	1.72	3.74	4.34	3.10
Excavation Rock E	2.60	9.09	6.03	4.78	4.27	5.80	10.24	2.20	5.47	5.94	4.46	5.53	7.21	3.42	2.69	4.89	3.54	8.17	2.32	5.02	8.07	3.95	5.64	6.24	5.99
Glazing	1.99	4.33	3.01	3.67	3.32	3.24	6.07	A	4.15	3.25	3.17	4.23	2.74	2.27	2.28	3.53	2.52	4.89	1.81	3.86	5.25	2.92	4.52	4.76	3.38
Insulating	.74	3.50	2.53	1.53	2.57	1.57	2.31	1.50	2.03	1.89	1.00	2.38	1.87	1.21	1.19	1.58	1.11	3.14	1.14	1.47	3.13	1.03	3.12	2.37	1.56
Lathing	.94	3.50	2.09	1.92	1.53	1.54	3.15	.80	1.93	1.77	1.53	1.95	1.37	1.25	1.11	1.62	1.16	3.00	.90	1.87	2.56	1.06	1.80	2.49	1.80
Masonry	1.01	5.95	2.44	1.28	2.10	1.41	3.56	.85	1.72	2.27	1.14	2.30	1.60	1.47	1.14	1.50	1.05	2.40	1.27	2.70	4.73	1.42	1.85	1.67	2.05
Painting & Decorating	1.30	4.77	2.43	1.81	3.47	1.97	5.19	1.80	3.23	2.38	1.78	3.29	2.13	2.38	1.38	1.85	1.71	3.70	1.25	2.55	B	1.72	1.84	3.12	2.77
Pile Driving N.O.C.	4.70	9.10	8.40	9.84	9.18	8.51	7.11	6.25	8.41	8.82	7.41	10.85	7.84	4.37	4.21	9.29	5.68	13.38	2.25	6.89	8.90	5.33	8.33	10.96	8.06
Plastering	.74	3.50	2.53	1.53	1.53	1.57	2.31	.80	2.03	1.89	1.00	2.38	1.51	1.21	1.19	1.58	1.11	2.01	1.14	1.47	2.80	1.03	1.97	2.37	1.41
Plumbing	.96	1.82	1.89	1.62	1.97	1.66	2.05	.75	2.26	1.79	1.34	1.71	1.63	1.25	1.18	1.69	.92	2.69	.77	1.88	1.97	1.23	1.74	1.94	1.91
Roofing	2.64	8.95	5.29	6.47	7.57	5.35	6.98	1.35	5.39	5.46	3.95	8.12	5.92	4.75	5.55	5.81	3.44	5.44	3.13	6.70	16.30	4.40	6.77	6.14	4.61
Sheet Metal Work	1.41	3.04	2.44	2.26	1.99	1.77	3.53	1.35	2.06	3.01	2.18	2.43	1.91	1.66	1.41	1.85	1.47	3.06	.97	2.08	2.58	1.38	1.80	3.07	1.91
Steel Erection Doors & Sash	1.31	4.90	2.00	2.39	3.32	2.18	4.85	5.75	3.18	2.71	1.95	2.72	2.58	1.85	1.53	2.32	1.66	4.33	1.27	2.52	3.87	2.13	3.10	3.33	2.67
Steel Erection Interior Ornament	1.31	4.90	3.84	2.39	3.32	2.18	4.85	5.75	3.18	2.71	1.95	2.72	2.58	1.85	1.53	2.32	1.66	4.33	1.27	2.52	3.87	2.13	3.10	3.33	2.67
Steel Erection Structural	5.60	19.60	12.79	11.51	12.71	12.25	17.20	5.75	19.69	10.73	10.50	16.34	9.37	5.35	9.42	10.95	8.09	9.57	5.66	10.47	23.25	11.13	11.44	11.46	11.68
Steel Erection Dwelling 2 stories	2.89	10.77	5.40	5.96	3.91	5.47	10.50	5.75	6.58	7.36	5.10	10.37	6.17	3.45	3.72	6.30	4.25	7.66	2.98	6.39	10.57	4.16	7.55	7.61	6.92
Steel Erection General	3.76	11.05	12.79	8.01	5.32	8.99	11.78	5.75	12.96	9.15	8.93	11.57	7.05	4.41	6.42	7.45	3.90	9.57	3.61	7.50	12.53	4.09	9.90	9.62	4.94
Tile Work Interior	.64	1.11	3.41	1.24	1.10	1.01	2.00	.70	1.79	1.30	.89	1.22	.98	.81	.74	1.06	.74	1.49	.61	1.29	1.84	.98	1.52	1.62	1.06
Timekeepers and Watchmen	1.36	5.95	F	2.25	F	2.24	4.68	F	2.73	3.19	2.21	F	2.66	1.82	1.62	2.41	1.64	4.46	1.31	2.71	4.15	2.09	3.21	2.93	3.31
Waterproofing Interior Brush	1.30	4.77	2.43	1.81	3.47	1.97	5.19	.80	3.23	2.38	1.78	3.29	2.13	2.38	1.38	1.85	1.71	3.70	1.25	2.55	3.09	1.72	1.84	3.12	2.77
Waterproofing Trowel Interior	.74	3.50	2.53	1.53	1.53	1.57	2.31	.80	2.03	1.89	1.00	2.38	1.51	1.21	1.19	1.58	1.11	2.61	1.14	1.47	2.80	1.03	1.97	2.37	1.41
Waterproofing Trowel Exterior	1.01	5.95	2.44	1.28	2.10	1.41	3.56	.80	1.72	2.27	1.14	2.30	1.60	1.47	1.14	1.50	1.05	2.40	1.27	2.10	4.73	1.42	1.85	1.67	2.05
Waterproofing Pressure Gun	1.85	7.14	2.94	2.49	2.99	3.10	6.29	.80	3.46	3.35	2.59	3.13	2.92	1.99	1.77	3.58	1.55	4.81	1.73	2.78	8.16	1.83	3.30	2.68	3.54
Wrecking	7.03	15.99	20.48	14.68	17.43	13.31	19.13	11.50	15.14	13.14	10.01	16.79	11.54	5.67	8.26	9.82	8.69	17.72	7.33	15.73	25.71	9.94	13.85	14.63	15.49

Classification of work	Mont.	Neb.	G Nev.	N. H.	N. J.	N. M.	N. Y.	N. C.	G N. D.	G Ohio	Okla.	Ore.	Pa.	R. I.	S.C.	S. D.	Tenn.	Texas	Utah	Vt.	Va.	Wash.	G W. Va.	Wis.	G Wyo.
Carpentry 1-2 Family Residences	$2.82	$2.08	$3.86	$2.40	$2.55	$2.84	$2.90	$2.19	$2.51	$1.80	$4.38	$4.65	$1.35	$3.13	$2.20	$1.18	$2.37	$3.21	$1.85	$2.20	$1.48	$4.10	$1.51	$2.34	$1.63
Carpentry 3 stories or less	2.82	2.08	3.86	2.63	2.75	3.11	4.60	2.42	2.51	2.03	5.43	4.65	1.35	4.03	2.27	1.18	2.37	3.21	1.85	2.20	1.57	4.10	1.51	3.19	1.63
Carpentry Interior trim, cabinet work	1.35	.95	1.85	1.21	1.22	1.67	2.40	1.49	2.51	.99	3.85	2.16	1.35	2.98	1.36	.82	1.47	2.10	1.85	1.04	.91	1.35	.88	2.34	1.63
Carpentry General	4.25	2.86	5.82	3.15	3.50	5.29	4.60	4.38	3.43	2.62	5.78	5.47	1.35	8.35	4.99	1.92	3.78	4.30	1.85	3.13	2.71	5.42	2.16	3.44	1.63
Chimney Construction, brick, concrete	12.68	7.22	16.37	8.79	10.30	12.34	27.90	10.95	11.19	7.57	18.58	9.24	A	25.61	11.97	4.50	10.46	12.33	9.98	7.17	5.82	A	7.48	11.18	8.78
Concrete Work Bridges Culverts C	6.23	3.54	8.54	5.72	4.40	8.05	6.40	3.72	6.09	3.21	10.50	7.18	1.40	10.95	6.91	3.09	3.94	5.24	5.36	4.53	2.12	6.74	3.00	4.44	4.72
Concrete Work 3 stories or less	2.21	1.16	3.03	2.17	2.40	1.59	5.40	1.10	1.97	1.14	3.39	4.26	1.40	4.66	.97	1.01	1.33	4.30	2.19	2.32	.94	4.00	1.05	1.62	1.93
Concrete Work General	3.95	2.75	5.41	3.50	4.40	2.20	5.40	2.95	3.19	2.10	8.29	4.89	1.40	7.72	3.10	1.90	2.74	4.30	2.85	2.59	2.34	4.59	1.55	2.77	2.51
Concrete or Cement Walks, Floors	1.69	1.27	2.32	1.50	1.90	2.20	2.60	1.43	1.42	1.01	3.25	2.34	1.40	3.50	1.83	.98	1.35	2.28	1.37	1.30	.79	2.06	.95	1.84	1.21
Electrical Wiring	1.52	1.07	2.08	1.42	1.60	2.79	2.50	1.21	1.11	1.11	2.37	2.42	2.60	1.80	1.93	.86	1.25	2.10	1.36	1.13	.97	2.27	.89	1.44	1.20
Excavation Earth D	4.59	2.00	6.29	3.13	2.85	5.31	5.10	2.69	3.62	1.96	7.81	5.45	1.60	6.16	2.58	1.64	3.15	3.22	3.03	2.81	1.64	4.81	1.52	2.44	2.67
Excavation Rock E	5.64	3.43	7.73	4.20	8.20	5.44	9.30	9.27	5.45	3.60	8.83	10.15	1.60	11.35	5.75	2.64	5.01	8.06	3.46	3.62	3.98	9.32	3.54	5.80	3.04
Glazing	4.14	2.65	5.67	3.34	3.50	4.59	4.70	3.82	4.37	2.39	5.51	4.92	A	8.85	4.40	1.97	4.04	3.07	1.21	2.83	2.29	4.61	2.52	4.31	1.06
Insulating	2.31	1.24	3.16	1.97	3.30	2.96	4.60	1.24	3.02	1.28	5.31	4.18	1.35	4.18	1.83	1.26	1.64	2.85	3.90	1.66	.82	3.61	1.11	3.01	2.64
Lathing	1.92	1.27	2.63	1.16	1.85	2.24	2.90	1.83	1.74	1.32	2.68	4.18	.70	4.10	2.06	1.02	1.97	1.88	1.83	1.36	1.17	3.61	1.16	1.63	1.61
Masonry	2.21	1.16	3.03	2.17	2.80	2.90	4.40	1.10	1.79	1.55	2.56	4.26	1.05	4.66	.97	1.01	1.33	4.30	1.86	2.32	.94	4.00	1.05	1.73	1.64
Painting & Decorating	3.29	1.49	4.51	4.06	3.90	3.71	5.10	1.65	1.78	2.51	3.61	4.88	1.90	3.51	2.19	1.67	2.26	2.14	1.97	1.97	1.51	4.58	1.71	2.44	1.73
Pile Driving N.O.C.	10.79	5.98	14.78	4.38	5.30	12.04	8.00	8.56	8.06	4.61	16.77	11.90	2.55	9.27	8.07	5.33	10.58	13.40	5.87	3.69	4.82	10.38	5.68	9.27	5.17
Plastering	2.31	1.24	3.16	1.97	1.85	2.96	3.80	1.24	1.90	1.28	2.75	4.18	.70	4.18	1.83	1.26	1.64	1.98	3.00	1.66	.82	3.61	1.11	1.62	2.64
Plumbing	1.60	1.09	2.19	1.53	2.05	2.03	2.80	1.17	1.68	1.32	2.72	2.14	.80	1.94	1.81	.93	1.32	2.34	1.42	1.36	.85	2.01	.92	1.90	1.25
Roofing	7.98	5.21	10.93	8.65	8.40	7.89	10.40	5.05	6.55	5.01	15.62	11.37	2.20	10.33	5.82	3.78	4.52	6.86	4.97	5.42	3.96	A	3.44	8.69	4.37
Sheet Metal Work	2.31	1.76	3.16	1.94	2.90	2.29	4.20	2.98	1.74	1.75	3.36	[illegible]	2.38	4.45	3.77	5.24	2.64	3.10	2.45	1.70	1.42	4.16	1.47	2.67	2.16
Steel Erection Doors & Sash	2.68	1.78	3.67	2.26	3.20	3.13	3.20	2.58	3.00	1.95	4.93	3.47	3.95	5.78	2.64	1.43	2.77	2.62	1.82	1.92	1.53	A	1.66	3.41	1.60
Steel Erection Interior Ornament	2.68	1.78	3.67	2.26	3.20	3.13	3.20	2.58	3.00	1.95	4.93	3.47	3.95	5.78	2.64	1.43	2.77	2.62	1.82	1.92	1.53	A	1.66	3.41	1.60
Steel Erection Structural	16.73	8.18	22.92	10.35	12.90	15.46	14.10	9.89	11.06	5.64	14.66	18.50	3.95	25.76	16.41	6.90	7.18	10.75	7.81	10.32	5.88	17.35	8.09	8.97	6.87
Steel Erection Dwelling 2 stories	7.39	4.66	10.12	5.56	4.00	8.97	4.60	6.93	7.30	3.64	13.83	8.89	3.95	15.16	7.99	3.24	6.68	8.90	5.97	4.88	3.25	8.48	4.25	5.04	5.25
Steel Erection General	11.49	7.02	15.74	8.87	6.90	15.46	11.10	8.40	9.57	4.65	11.04	12.31	3.95	20.55	7.68	3.60	5.48	8.90	7.81	7.39	3.79	11.55	3.90	8.77	6.87
Tile Work Interior	1.14	.83	1.56	1.06	1.36	1.48	2.30	.91	1.47	.85	2.05	1.55	.70	2.53	1.26	.72	1.06	1.47	2.01	.95	.62	1.46	.74	1.09	1.77
Timekeepers and Watchmen	2.68	1.83	3.67	2.30	A	3.16	4.10	2.59	3.10	1.92	3.87	3.99	F	5.87	2.48	1.54	2.84	F	2.39	1.99	1.71	4.18	1.64	3.35	2.10
Waterproofing Interior Brush	3.29	1.49	4.51	4.06	3.90	3.71	5.10	1.65	1.78	2.51	3.61	4.88	.70	3.51	2.19	1.67	2.26	2.14	1.97	1.97	1.51	4.58	1.71	2.44	1.73
Waterproofing Trowel Interior	2.31	1.24	3.16	1.97	1.85	2.96	3.80	1.24	1.90	1.28	2.75	4.18	.70	4.18	1.83	1.26	1.64	1.93	3.00	1.66	.82	3.61	1.11	1.62	2.64
Waterproofing Trowel Exterior	2.21	1.16	3.03	2.17	2.80	2.00	4.40	1.10	1.79	1.55	2.56	4.26	.70	4.66	.97	1.01	1.33	4.30	1.86	2.32	.94	4.00	1.05	1.73	1.64
Waterproofing Pressure Gun	3.95	2.75	5.41	3.50	4.70	2.20	5.40	2.95	3.19	2.10	8.29	4.89	.70	7.72	3.10	1.90	2.74	4.30	2.85	2.59	2.34	4.59	1.55	2.77	2.51
Wrecking	16.57	10.66	22.70	13.33	18.70	18.50	A	12.58	13.39	5.98	18.29	23.63	10.00	30.23	17.07	8.08	12.77	13.08	22.51	11.34	6.33	22.16	8.69	13.08	19.80

*A Specially rated—refer to company. *B Rate varies with type of work. *C includes form work. *D Pile driving, caisson and dam work separately rated. *E Special occupational disease loadings apply. *F Assigned to main classification. *G Subscription to State Fund mandatory—Nevada, Industrial Comm., Carson City, Nev.; Workmen's Compensation Bureau, Bismarck, N. Dak.; The Industrial Commission of Ohio, Columbus, Ohio; State Compensation Commission, Charleston, W. Va.; Workmen's Compensation Dept., State Treasurer's Office, Cheyenne, Wyo.



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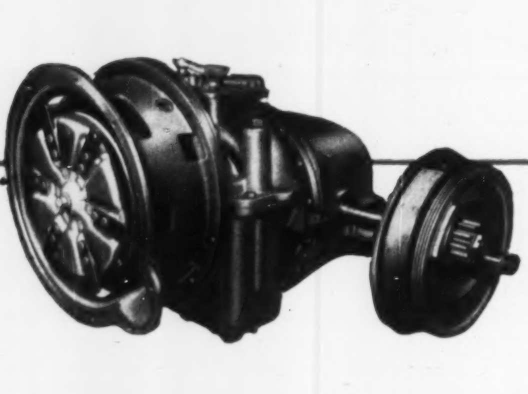

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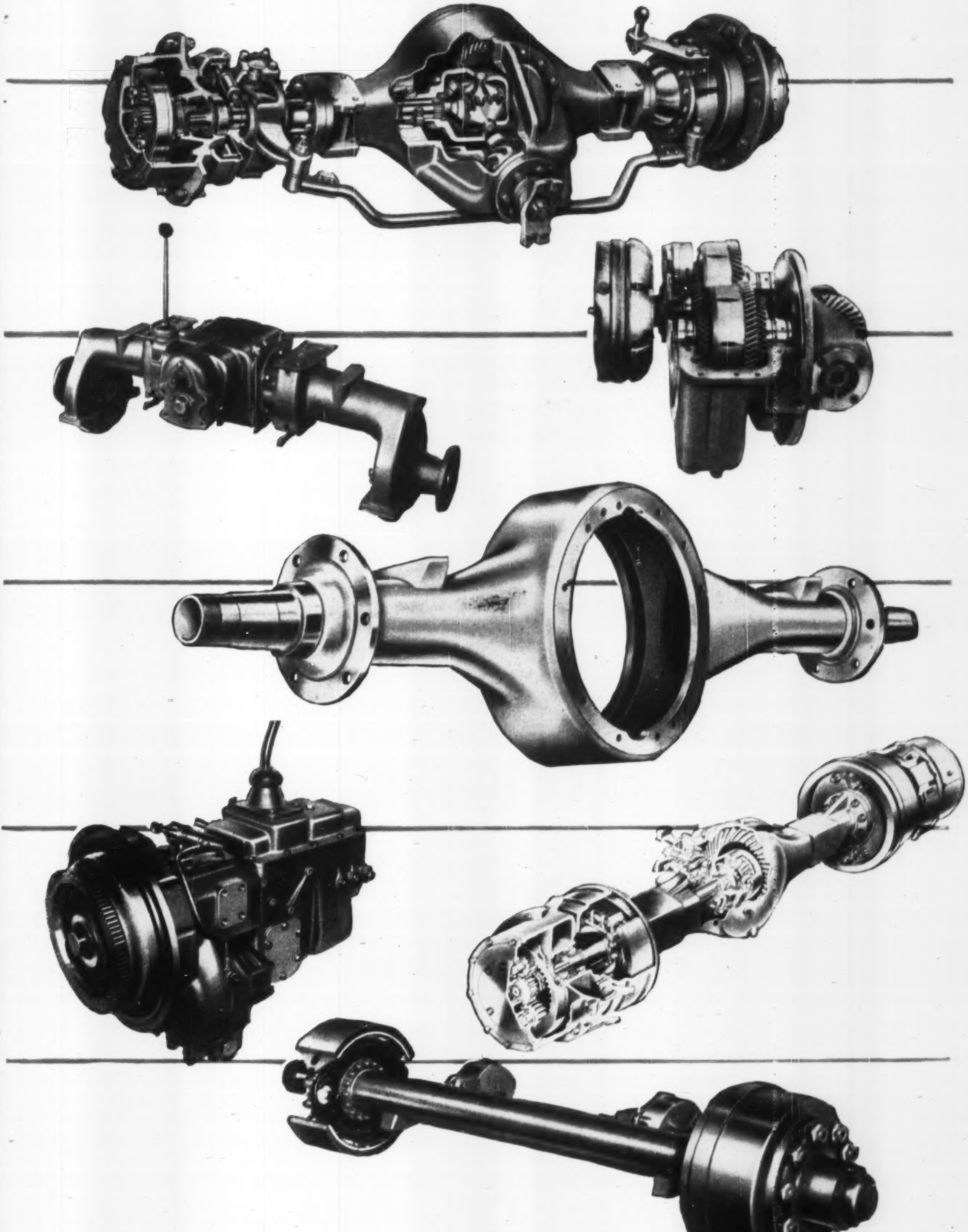

CANTON
CORPORATION-LIMIT

Canton Gets a New Concrete Distribution Line

This crew is putting in the fourth piece of pipe in a 4500-foot concrete feeder line for Canton, Ohio. The line runs from the north corporation line south on Broad, west on 8th, and south on Wertz to 3rd where it ties into an existing 12-inch line. Along the route the new line feeds distribution lines of 6, 8 and 12 inches.

The line went in easily and with little interference to traffic. The backhoe in the picture dug the trench and laid the pipe for the entire line. A supply of short lengths and bevel adapters was kept on the job to make on-the-spot turns to clear obstructions. A bevel adapter is a small special made up of a bell ring and spigot ring set back to back at an angle of 2° to 4°.

The line has been tapped three times since it was laid in 1954. The $\frac{3}{4}''$ taps were made by Canton Waterworks crews using their regular equipment and new-design fixtures furnished by the manufacturer of the pipe. The entire line is 24-inch prestressed concrete cylinder pipe made by Price Brothers Company, Dayton 1, Ohio. Price has plants in Dayton, Cleveland and Miami, Fla.

Price Brothers

Construction Materials Easier, Except Steel

The shortage signs are disappearing from ENR's 21-cities construction materials supply board (see table below), with one notable exception—steel. Structural steel shapes are hard to come by in all key cities except Dallas, and in Dallas, the "adequate" supply refers only to small tonnages. Deliveries of steel frequently are indefinite or longer than a year.

Reinforcing bars, sheetpiling steel and stainless steel sheets are almost as scarce as structurals. Los Angeles suppliers closed sheetpiling books for 1956 in the first quarter and are now booking for 1957.

On the other hand, cement is adequate to plentiful in all but two major cities. Detroit's shortage is slight and temporary—due to a strike, now settled.

Lumber, clay and concrete sewer pipe, brick, mineral wool and glass fiber insulation, gypsum lath and sheathing, are in good supply in nearly all 21 cities reporting. Aluminum building sheets are still tight in three areas; window glass in five.

What's behind the easing in materials supplies in a boom construction year? Here are some of the factors:

- **An increase in the output of basic materials** like aluminum, cement, gypsum as a result of expansion of plant capacity. October aluminum production is running 11% ahead of last year, with additional capacity still coming up for 1957 that is stimulating the industry to look around for new markets. Cement stocks in August were 34% greater than a year ago, as production to date outpaced shipments. But the big highway program now getting under way may change the cement picture in a few months.

- **A decline in homebuilding** in 1956 following a record boom in 1955. This cut demand for lumber, gypsum products, brick, and window glass. Brick production this year forged ahead 13% through August; shipments lagged 1% behind the first eight months of 1955.

(*Continued on page 142*)

Materials Supply and Delivery in 21 Cities in 1956

Key: Supplies . . . . . **SH**—**Shortage** **A**—**Adequate** **P**—**Plentiful**
Deliveries . . . . **N**—**Normal** **SL**—**Slower than normal** **I**—**Immediate** **Delivery time shown in days**

Material	Atlanta			Baltimore			Birmingham			Boston			Chicago			Cincinnati			Cleveland		
	Sup. Jan.	Sup. Nov.	Del. Nov.	Sup. Jan.	Sup. Nov.	Del. Nov.	Sup. Jan.	Sup. Nov.	Del. Nov.	Sup. Jan.	Sup. Nov.	Del. Nov.	Sup. Jan.	Sup. Nov.	Del. Nov.	Sup. Jan.	Sup. Nov.	Del. Nov.	Sup. Jan.	Sup. Nov.	Del. Nov.
Cement, Portland	A	A	2-3	A	A	2-4	P	P	I	P	P	1-6	A	A	I	A	A	1-2	A	A	1-2
Structural shapes	SH	SH	60	A	SH	14-28	SH	SH	90	SH	SH	60	SH	SH	365	SH	SH	30-60	SH	SH	90-120
Reinforcing bars	SH	SH	Weeks	A	A	7-14	SH	SH	90	P	A	30	A	SH	14-21	A	SH	30-60	A	A	7
Sheetpiling steel	SH	SH	Weeks										SH	SH	180	A	SH	40-75			
Copper water tubing	P	A	N	A	A	I	A	A	I	P	A	1-2	A	A	1-30	A	A	I	A	P	1-2
Centrifugal cast iron pipe	A	A	N	A	A	7-10				SH	SH	42	A	SH	28-42						
Stainless steel, flat				A	A	3-5	A	SH	180-240	P	SH	N	A	A	To 14	P	SH	20-30	A	A	7-10
Aluminum sheets, flat				A	A	3-5	A	A	30	SH	A	7-14	SH	A	To 14	P	P	3-7	A	P	5-7
Douglas fir				A	A	2-10	A	A	10-14	P-SH	A-SH	2-28	SH	A	7-14	A	P	1-2	A	P	4-5
Southern pine	SH	A	To 14	A	A	2-7	A	A	7-10	P	A	7-21	A	A	7-14	A	A	8-10	A	P	4-5
Plywood, Douglas fir	A	A	7	A	A	7	A	A	19-21	SH-P	A	2-4	A	A	7-14	A	A	20-30	A	A	21
Vitrified clay sewer pipe	A	A	14	A	A	3-4	P-SH	A-SH	7-120	P	A	1-7	A	A	7-14	A	A	3-4	A	A	7
Concrete sewer pipe	A	A	14	P	A	1-2	A	A	90	P	A	1-7	A	A	I	A	A	2-3	A	A	2-3
Structural clay tile	SH	A	3-4	A	A	5-7	SH	A	14-21	P	A	2	A	A	2	P	P	5-7	A	A	2-3
Brick	A	A	N	P	P	1-2	SH	SH	30	P	A	2	A	A	1-2	P	P	5-7	A	A	2-3
Mineral wool insulation	A	P	I	A	A	3	P	A	30	SH	A	2-7	A	A	14-21	A	A	20-30	P	P	2-3
Glass fiber insulation	A	A	I	A	A	3	A	A	21-28	SH	P	I	A	A	14-21	A	A	20-30	A	A	21-28
Gypsum lath	SH	A	I	SH	SH	3-7	SH	A	I	SH	A	2-3	A	A	To 10	P	A	5-10	SH	A	3-5
Gypsum sheathing	SH	A	I	SH	SH	3-7	SH	A	I	SH	A	2-3	A	A	To 21	A	A	40-60	SH	A	3-5
Window glass	SH	A	14	A	A	2-4	SH	A	1-3	SH	P	2-7	SH	A	1-7	SH	SH	Indef	SH	SH	28-35

Material	Dallas			Denver			Detroit			Kansas City			Los Angeles			Minneapolis			New Orleans		
	Sup. Jan.	Sup. Nov.	Del. Nov.	Sup. Jan.	Sup. Nov.	Del. Nov.	Sup. Jan.	Sup. Nov.	Del. Nov.	Sup. Jan.	Sup. Nov.	Del. Nov.	Sup. Jan.	Sup. Nov.	Del. Nov.	Sup. Jan.	Sup. Nov.	Del. Nov.	Sup. Jan.	Sup. Nov.	Del. Nov.
Cement, Portland	A	A	I	A	A	N	A	SH	Sl	SH	P	7	A	P	N	P	P	N	A	A	Sl
Structural shapes	SH	A	14	SH	SH	90	SH	SH	Indef.	P	SH	Indef.	P	SH	Sl	SH	SH	180-180			
Reinforcing bars	A	A	7	SH	SH	90	SH	SH	60-90	P	A	2	P	SH	Sl	A	SH	14-20	SH	SH	Sl
Sheetpiling steel	SH	A	14	SH	SH	42-56	SH	SH	120				SH	SH	Indef.	SH	SH	Indef.			
Copper water tubing	P	A	30	SH	A	I	SH-A	A	N	A	P	I	P	P	N	SH	A	10	SH	A	N
Centrifugal cast iron pipe	P	P	30							A	A	10	P	P	N	A	A	70			
Stainless steel, flat	A	A	10	SH	SH	120-240	SH	P	N	SH	SH	45-60	P	P	N	A	SH	Sl	SH	A	N
Aluminum sheets, flat	A	A	10	SH	SH	90-120	SH	A	14-28	SH	SH	45	P	P	N	A	A	N	SH	A	N
Douglas fir				SH	A	30	A-SH	A	N	P	A	30	P	P	N	SH	A	14-21	SH	P	N
Southern pine	P	P	7-14				A-SH	A	N	P	A	30				SH	A	14-21	SH	P	N
Plywood, Douglas fir	P	A	30					A	N	P	A	30	P	P	N	A	A	N	SH	A	N
Vitrified clay sewer pipe	P	P	7	A	A	I	SH	A	N	P-SH	P	I	P	P	N	A	A	N	A	A	N
Concrete sewer pipe	P	P	7	P	P	I	A	A	N	P	P	2	P	P	N	SH	A	N	A	A	N
Structural clay tile	P	P	10				P	A	N	A	P	2				P	P	N	SH	A	N
Brick	P	P	10	SH	A	N	A	A	N	A	P	2	P	P	N	P	P	N	SH	A	N
Mineral wool insulation	P	P	14	A	A	30	A	A	3-10	A	P	14-28	P	P	N	A	A	N	A	A	N
Glass fiber insulation	P	P	14	A	A	I	P	A	N	SH	P	14-28	P	P	N	A	A	N			
Gypsum lath	P	P	14	SH	A	30	SH	P	N	P	P	14-28	P	P	N	SH	A	N	A	A	N
Gypsum sheathing	P	P	14	SH	A	30	SH	A	N	P	P	14-28	P	P	N	A	A	N	A	A	N
Window glass	P	P	7-14	SH	SH	20	SH	A	N	SH	P	I	P	P	N	SH	A	N	SH	A	N

Material	New York			Philadelphia			St. Louis			San Francisco			Seattle			Montreal			Toronto		
	Sup. Jan.	Sup. Nov.	Del. Nov.	Sup. Jan.	Sup. Nov.	Del. Nov.	Sup. Jan.	Sup. Nov.	Del. Nov.	Sup. Jan.	Sup. Nov.	Del. Nov.	Sup. Jan.	Sup. Nov.	Del. Nov.	Sup. Jan.	Sup. Nov.	Del. Nov.	Sup. Jan.	Sup. Nov.	Del. Nov.
Cement, Portland	P	A	N	A-SH	P	I	A	A	1-2	A	P	I	P	P	2	A	A	14	P	SH	2
Structural shapes	SH	SH	Indef.	SH	SH	To 90	A	SH	60-90	A	A-SH	45	A	SH	120	SH	SH	150	SH	SH	200
Reinforcing bars	A	A	N	SH	SH	To 90	A	A	5-60	P	A	14-21	A	SH	120	SH	SH	90	SH	SH	To 70
Sheetpiling steel				A	A	I				P	A-SH	30				A	SH	180	SH	SH	Indef.
Copper water tubing	P	P	I	SH	A-SH	1-30	A	A	2-10	P	P	I	A	A	30	SH	SH	30	A	A	1-2
Centrifugal cast iron pipe				P	A-SH	1-30	A	SH	42+	A-SH	P	14	P	A	30	P	P	7	A	A	1-7
Stainless steel sheets, flat	SH	SH	84	A	SH	To 90	SH	A	3-10	A-SH	A-SH	30-45	A	SH	90-120	SH	SH	30	A	SH	To 126
Aluminum sheets, flat	A	A	2-3	A	P	N	A	A	2-120	A	A	30	A	A	65-70	SH	SH	30	SH	A	56
Douglas fir	SH	A	3-5	A	A	1-7	A	A	1-3	SH	A-P	7-21	SH	A	10-21	P	P	7	SH	A	1-7
Southern pine	A	A	3-5	A	A-P	1-7	A	A	1-3							P	P	7	SH	P	7
Plywood, Douglas fir	A-SH	P	45	A	A-P	1-7	SH	A	1-3	P	P	14	A	A	7	P	SH	30	SH	SH	60-90
Vitrified clay sewer pipe	A	SH	Indef.	P	P	I	A	A	3-30	P-A	P	7	P-A	P-A	1-45	A	A	14	A	P-A	1-7
Concrete sewer pipe	A	P	2	P	P	I	A	A	1-5	P	P	7	P	P	I	P	A	7	A	A	I
Structural clay tile	A	P	3	P	P	N	SH	A	3-7	P	P	3	A	A	I	A	A	7	P	P	1-2
Brick	P	A	N	P	P	N	A	A	1-2	P	P	3	P	P	I	A	A	30	A	A	7-30
Mineral wool insulation	P	A	N	P	P	I	A	A	1-3	P	P	7-14	P	P	2	P	P	7	A	A	I
Glass fiber insulation	SH	A	N	P	P	I	A	A	2+	P	P	7-14	A	P	1-2	P	P	7	A	A	I
Gypsum lath	A	P	N	A	A	I	A	A	1-3	A	P	7	P	P	2	P	P	7	A	A	I
Gypsum sheathing	A	P	N	A	A	I	A	A	1-3	A	P	7	P	P	2	P	P	7	A	A	I
Window glass	SH	P	N	SH	A-SH	1-14	SH	SH	3-15	SH	A	30-45	SH	A	15-30	A	A	7	SH	A	1-14

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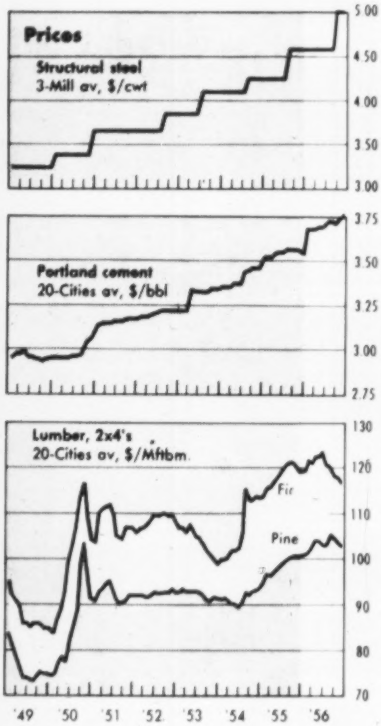

Lumber producers cut back production 4% through the first nine months of 1956 (and raised this to 11% in September), but shipments dragged 8% behind 1955 through the first three quarters, sagging as much as 17% behind last year in September.

- **Last, but not least, is the influence of tight money,** which handicapped a host of small and moderate-size projects and resulted in postponement of some schools, roads, mass housing developments, and commercial undertakings.

Building Materials Prices

ENR average yearly prices at New York, except steel

Year	Brick common per M	Cement per bbl	Lime per bbl	Pine per M ft bm	Steel shapes per cwt *h*
1874	$7 41	$1 48*R*	$1 50*a*	$26 00*d*	..
1898	6 65	2 25*R*	95*a*	21 75*d*	
1907	6 16	1 55*C*	95*a*	30 50*d*	1 75
1913	6 75	1 18*C*	915*a*	25 04*e*	1 50
1929	11 71	2 23*C*	2 25*b*	64 50*f*	1 92
1932	9 75	1 62*C*	2 25*b*	39 91*f*	1 56
1938	13 10	2 12*C*	2 80*b*	59 33*f*	2 18
1939	13 46	2 20*C*	2 80*b*	64 35*f*	2 10
1942	14 17	2 20*C*	2 80*b*	85 61*f*	2 10
1947	26 38	3 46*C*	24 34*c*	115 83*g*	2 61
1948	30 33	4 05*C*	26 32*c*	114 38*g*	2 98
1949	33 00	3 32*p*	26 80*c*	98 13*g*	3 25
1950	33 50	3 52*p*	27 10*c*	131 88*g*	3 42
1951	37 92	3 78*p*	31 00*c*	154 79*g*	3 65
1952	36 45	3 84*p*	32 00*c*	155 00*g*	3 73
1953	35 33	3 97*p*	32 00*c*	156 67*g*	3 98
1954	38 92	4 01*p*	32 00*c*	157 21*g*	4 15
1955	41 00	4 24*p*	33 67*c*	166 29*g*	4 40

BRICK: wholesale, fob; CEMENT: net, delivered •*R* Rosendale, rest Portland •*C* in cloth bags delivered (1949 $4.23) price of bags included •*p* in paper bags, fob city in carload lots LIME: •*a* common lump, wholesale, fob, 180 lb., net •*b* 280 lb. •*c* common hydrated, delivered, per ton (40 bags of 50 lb. ea) no longer quoted per bbl. LUMBER: No. 1 common, rough •*d* 1-in. yellow pine, wholesale at dock •*e* 3-in. LLYP •*f* 3x12 LLYP from Lumber Trade Jl. •*g* 3x12 SLYP (LLYP out of market) STEEL: *h* fob Pittsburgh.

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655 Madison Ave., New York 21, N.Y.

BELGAMER CORP.
350 Fifth Avenue, New York 1, N.Y.

BELGIAN AMERICAN MERCANTILE CORP.
441 Lexington Avenue, New York 17, N.Y.

COLUMBUS STEEL CORP.
575 Madison Ave., New York 22, N.Y.

COUTINHO CARO & COMPANY, INC.
545 Fifth Ave., New York 17, N.Y.

THE CRISPIN COMPANY, LTD.
1611 Bank of Commerce Bldg., Houston, Texas

MR. R. W. EAST
2510 Hillside Drive, Dallas, Texas

FERRIC INDUSTRIES, INC.
122 East 42nd St., New York 17, N.Y.

FERROSTAAL OVERSEAS CORP.
25 Broadway, New York 4, N.Y.

FERRO UNION CORP.
595 Madison Ave., New York 22, N.Y.

FRANCOSTEEL CORP.
41 East 42nd St., New York 17, N.Y.

J. GERBER & COMPANY, INC.
855 Avenue of the Americas, New York 1, N.Y.

INDUSSA CORP.
511 Fifth Avenue, New York 17, N.Y.

INTERNATIONAL SELLING CORP.
122 East 42nd St., New York 17, N.Y.

MR. L. D. KELLER
3337 West Queen Lane, Philadelphia 29, Pa.

MR. W. O. LANGE
P.O. Box 65, Miami Shores 53, Fla.

MARCEL LOEB & COMPANY, INC.
30 Church Street, New York 7, N.Y.

WM. H. MULLER & COMPANY, INC.
122 East 42nd St., New York 17, N.Y.

KURT ORBAN COMPANY, INC.
34 Exchange Place, Jersey City 2, N.J.

OVINGSTEEL, INC.
30 Church St., New York 7, N.Y.

PAN AMERICAN TRADE DEVELOPMENT CORP.
2 Park Avenue, New York 16, N.Y.

M. PAQUET & COMPANY, INC.
17 Battery Place, New York 4, N.Y.

PAUL J. DEVIGNEZ, (PHENIX WORKS S.A.)
507 Fifth Avenue, New York 17, N.Y.

MAURICE PINCOFFS COMPANY
Melrose Bldg., Houston 2, Texas

PORT EVERGLADES STEEL CORP.
Port Everglades Station, Fort Lauderdale, Fla.

EMILE REGNIERS CO. (U.S.A.), INC.
415 Lexington Avenue, New York 17, N.Y.

MR. REGINALD V. ROBERTS
281 Vernon Street, Norwood, Mass.

WALTER H. ROTHSCHILD & CO., INC.
38 Park Row, New York 7, N.Y.

SIPANAM, INC.
233 Broadway, New York 7, N.Y.

TUTEUR & COMPANY, INC.
52 Wall Street, New York 5, N.Y.

M. WIMPFHEIMER & SON, INC.
250 West 57th Street, New York 19, N.Y.

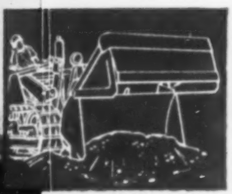
WINTER, WOLFF & COMPANY
76 Beaver Street, New York 5, N.Y.

get exclusive 4-machine utility... finger-tip easy...

in all International Drott 4-in-1 Skid-Shovels!

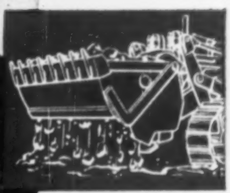
You get famous Skid-Shovel triple-power pry-over-shoe break-out action

...plus 42° ground-level bucket roll-back...simply by moving a lever with finger-tip ease...stopped or on the go. You can also use fast, depth-controlled Drott straight-forward bucket loading—and time-gaining, strain-saving skid-shoe load transport! You get this concrete-shattering break-out power, this stepped-up excavating and material-handling capacity, *only in the 4 International Drott Four-In-One sizes!* It's the 3-yard TD-18 Four-In-One, shown, breaking up concrete slab!



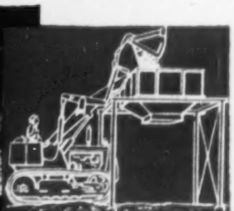
For big bulldozing capacity, just move the Four-In-One's machine-selector lever to open the clam hydraulically. Then you regulate dozing depth, easily and accurately, by hydraulic radius control of blade pitch (forward or backward)—to roll earth, to backfill, grade or spread with precision. Watch this TD-14 Four-In-One as a dozer—stripping hard-frozen top-soil, 8 inches deep—keeping construction rolling, even in cold weather. *This responsive, large capacity bulldozing action, Drott-developed, is another Four-In-One exclusive!*

* * *



Nobody but International Drott gives you Four-In-One Bullclam versatility, to strip, grade, spread, or compact with inch-close accuracy—to put regular "carry-type scraper" action at your finger-tip command! See how positive clam lip control enables the Four-In-One Bullclam to heap-load itself, with fast, earth-boiling action. Then it's easy to dump the material all at once, or spread it evenly. Use the load-weighted bucket, and hydraulic down-pressure, too, for positive fill compaction. Here's the new bonus-powered TD-9 with 1½-yard Four-In-One working as a multiple-duty Bullclam.

* * *



See how you quickly switch to clamshell action to "surround" loose material, get instant bucket-fill in one fast gulp, and save hand labor on clean-up work. You can also use the Four-In-One clamshell position for big-capacity stockpile material handling. And the versatile Four-In-One clamshell, as a bottom-dumper, gives you a 2½-foot dumping height advantage over ordinary roll-forward buckets! Yes, and bottom dumping assures you positive bucket cleanout, even of sticky clay or gumbo! Only an International Drott Four-In-One gives you this *built-in, job-getting clamshell action.* Here's the 1-yard TD-6 Four-In-One "cleaning up" around a foundation.

And besides 4-machine utility,

each Four-In-One model also gives you all the other famous International Drott exclusives! Exclusive shock-swallowing Hydro-Spring that reduces impact force effects by 67%, or more—also greatly extends hydraulic hose life. Exclusive *heap-keeping* parallelogram lift action. Exclusive attachments: like Skid-Grapples, Grubber Blades, Rock Forks, and others—to multiply usefulness. See your International Construction Equipment Distributor and see the movie, "Versatility Unlimited." Then ask for a Four-In-One demonstration!

International Harvester Company, Chicago 1, Illinois
Drott Manufacturing Corp., Milwaukee 15, Wis.

IH®
INTERNATIONAL HARVESTER

INTERNATIONAL® DROTT®

See you at the ROAD SHOW
CHICAGO
Jan. 28-Feb. 2, 1957

TURNPIKE TESTS PROVE:

"75" PAYSCRAPER®

CARRIES

12% more...

DELIVERS IT

15% faster

• • • • • •

TD-24 push

An International TD-24 tractor and "75" Payscraper recently out-pushed, out-loaded, and out-sped all equal-sized competitive units in accurate on-the-turnpike tests. This data was obtained on the Illinois toll road job near Rockford.

All tests were conducted under similar conditions on the same cut, in the same material, and under the supervision of the contractor's grade foreman. Loading time was limited to exactly one minute. Scraper loads were weighed on special new accurate scales. Haul length was held to 2,000 feet for all scrapers.

Final figures amazed all observers! Results showed first, that *the "75" Payscraper carried 12% more dirt per load...delivered it 15% faster than the other two scrapers tested;* second, that *the TD-24 torque converter pusher heaped an average of 1.2 cu yd extra into all scrapers tested.* (See charts, at right.) A competing manufacturer substantiated these same figures!

Here's conclusive proof that no matter what scraper the TD-24 pushes, you load more in any given time... and that the "75" Payscraper carries more, no matter what pushes it! And that the TD-24 and "75" Payscraper, teamed together, out-produce other equipment combinations with faster loading, bigger loads, and all-around faster cycles.

Prove the stand-out pushing, loading, and cycle-speeding performance of the International TD-24 tractor and "75" Payscraper on your own jobs. Ask your International Construction Equipment Distributor for a demonstration!

Load-Speeding Action. High horsepower-to-weight ratio and speeds up to 24 mph—plus operating ease of air-assisted clutch; big, safe, 4-wheel air brakes; exclusive Hydro-Steer—all help the Payscraper gain time, increase earth-moving capacity!

Clipboard in Hand, equipment engineer signals "75" to begin controlled one-minute push-loading from TD-24 torque converter tractor. Although TD-24 push-packed an average 1.2 cu yd more in all scrapers, it loaded 2.1 cu yd more in "75" Payscraper, than competing pusher!

INTERNATIONAL
PAYSCRAPER

loads 1.2 extra yds. into all scrapers!

PAYLOAD TESTS (average)

Pusher	International "75" Payscraper	Scraper "A"	Scraper "B"
International TD-24 Torque Converter tractor	20.6 cu. yd.	18.2 cu. yd. "75" bonus 2.4 cu. yd.	17.5 cu. yd. "75" bonus 3.1 cu. yd.
Pusher "A"	18.5 cu. yd.	17.0 cu. yd. "75" bonus 1.5 cu. yd.	17.1 cu. yd. "75" bonus 1.4 cu. yd.

CYCLE TIME TESTS (average)

International "75" Payscraper	4.8 min.	"75" Payscraper Proves 15% faster ...delivers up to 19 extra loads per 10-hour day
Scraper "A"	5.7 min.	
Scraper "B"	5.6 min.	

See you at the ROAD SHOW—CHICAGO Jan. 28-Feb. 2, 1957

INTERNATIONAL HARVESTER

INTERNATIONAL®
Construction Equipment

International Harvester Company, 180 N. Michigan Avenue, Chicago 1, Illinois

A COMPLETE POWER PACKAGE INCLUDING: Crawler, Wheel, and Pipe-Boom Tractors . . . Self-Propelled Scrapers and Bottom-Dumps . . . Crawler and Rubber-Tired Loaders . . . Off-Highway Trucks . . . Diesel and Carbureted Engines . . . Motor Trucks

TWO LOAD-SPEEDING

International® "95"

average 2400 cu. yds. of rock

TWO-TON CHUNKS OF LIMESTONE bang down into the huge Payhauler body—the rugged high-tensile steel sides, triple-section bottom, and super-duty "spring cushions" are built to take rock-shock! And the "95" Payhauler frame is strongest known of any off-highway truck in its class.

WITHOUT LOSING A SWING, 3 cu yd shovel always finds "95" waiting for load. Powerful, fuel-saving 335 hp Turbo-charged diesel engine keeps power high, reduces fuel consumption 10% or more. Maximum engine torque is transmitted efficiently through new cerametallic clutch and shock-saving planetary final drive into greater pay-off work power!

BODY UP... DOWN... IN ONLY 12 SECONDS! Three-stage, double-action hydraulic hoist provides full-time power control. Built-in hydraulic snubber valves assure smooth, over-center dumping action and gentles body return. Proper weight distribution permits safe dumping at edge of fill, yet drive wheels carry ample weight for steep-grade traction.

2,000 ft.
cycle includes
12% grade

NO FOOT-BRAKING DOWN-GRADE! Heap-loaded "95" Payhauler rolls along safely down to the fill at 10 mph. Hand-operated Torqmatic brake, "torque converter in reverse," is standard equipment, gives accurate, confidence-building control at any speed . . . on any grade. Earl and Roy Schenewerk, operators of the "95's," say, "Because of Torqmatic brakes, these Payhaulers operate easier, smoother and safer than any other unit we've ever driven. Now, we have no worry on this steep grade."

Payhaulers® per 10-hour day!

"Best Production I've ever had,"

Says H. D. BROWN
Project Superintendent,
Clarkson Construction Co.,
Kansas City, Mo.

High speed (up to 38 mph.), 16 cu yd capacity, and next-to-automatic operating control of two new International "95" payhaulers are getting Clarkson Construction Co. record-breaking rock production of 2400 cu yds per 10-hour day. Payhaulers are producing this outstanding yardage on the company's 1000-foot cut through dolomite limestone—part of their 7.5 mile, 2-lane highway contract between Bonne Terre, and Halifax, Mo.

The Payhaulers are operating on a 2000-foot cycle which includes a 12% grade. On this grade, too tricky and treacherous for Clarkson's other rock haulers, Payhaulers maneuver speedily and safely downgrade—under positive Torqmatic braking control! Payhaulers' high speed of up to 38 mph also permits the fast average round-trip travel time of only 2 min, 45 sec. That's faster than the 3 cu yd shovel can load one!

H. D. Brown, Project Superintendent, says, "The Payhaulers have got all other rock trucks beat. Control we've had with Payhaulers on this job is something we didn't have on any other truck. We've averaged 150 to 162 loads of 16 to 18 cu yds per 10-hour day. It's the best production I've ever had!"

Other veteran rock men who have used or seen the International "95" Payhauler in action say the same thing. You'll join them, too! Ask your nearby International construction equipment distributor to give you a demonstration.

INTERNATIONAL HARVESTER

INTERNATIONAL® Construction Equipment

International Harvester Company, 180 N. Michigan Avenue, Chicago 1, Illinois

A COMPLETE POWER PACKAGE INCLUDING: Crawler, Wheel, and Pipe-Boom Tractors . . . Self-Propelled Scrapers and Bottom-Dumps . . . Crawler and Rubber-Tired Loaders . . . Off-Highway Trucks . . . Diesel and Carbureted Engines . . . Motor Trucks

See the LATEST in BIG LOADERS at the Road Show

(SOUTH HALL — ALLIS-CHALMERS AREA)

new TRACTOMOTIVE TL-20 TRACTOLOADER

20,000 lb

2-cu yd capacity • 95.5 hp

HAS—

FULL POWER-SHIFT TRANSMISSION that enables you to go from any forward to any reverse speed instantly. You quick-shift "on the fly" — no stop-and-go shifting.

HAS—

HYDRAULIC TORQUE CONVERTER DRIVE that multiplies torque 350 percent . . . provides the smoothest loading action you've ever seen in a wheel loader. No butting or ramming, no engine stalls.

HAS—

- High Traction Differential with Pin-Connected, PLANETARY AXLES
- Tip-Back Bucket
- Rear-Wheel Power Steering
- 4-Wheel Drive and 4-Wheel Power Brakes
- Full-Flow Oil Filter
- Screen and Magnetic Filters in Hydraulic System
- Lift and Dump Cylinders located well above ground and out of the way.
- One-Piece Welded Frame

Only Tractomotive brings you all these operating and service advantages. You PAY LESS . . . You GET MORE.

TRACTO — a sure sign of modern design

TRACTOMOTIVE EQUIPMENT
IS SOLD AND SERVICED BY YOUR ALLIS-CHALMERS CONSTRUCTION MACHINERY DEALER.

TRACTOMOTIVE

TRACTOMOTIVE CORPORATION, DEERFIELD, ILLINOIS

Wholesale Prices

Building materials prices reached a new postwar high in August 1956 and then began to slip slightly. Yet the peak of 131.5 of the 1947-49 average was only 1.6% above the year's low recorded in January, according to the Wholesale (Primary) Price Index of the U.S. Bureau of Labor Statistics.

However, there were sharp variations among individual commodities.

Metals, for example, made big gains. October prices for structural shapes and concrete reinforcing bars soared 8% over a year ago under the impact of the boom in industrial construction and the higher wage rates won by steel labor following the strike last summer.

On the other hand, copper water tubing was off nearly 9% from October 1955 following the recent decline in basic copper prices. Douglas fir prices slipped more than 7% when the volume of housing construction fell behind the all-time peak of 1955. Softwood plywood slid 18%.

Big demand for cement pushed cement prices 7% higher than October 1955. Plate glass prices rose 6%. Gypsum and structural clay products rose 4%; prepared asphalt roofing, 3%; while insulation materials sagged 6%.

Wholesale Price Index, Building Materials

Bureau of Labor Statistics, 1947-49 = 100

Month	1947#	1948#	1949#	1950#	1953	1954	1955	1956
Year	94.0	104.0	102.0	109.5	119.9	120.2	125.5	
Jan	88.7	100.7	105.4	102.1	118.4	119.6	122.1	129.4
Feb	89.9	101.2	104.9	103.2	118.7	119.2	122.5	129.6
Mar	91.5	101.8	104.4	104.1	119.2	119.3	122.8	130.5
Apr	92.8	102.0	103.4	104.7	119.9	119.0	123.4	131.2
May	93.0	102.5	102.4	106.3	120.2	118.6	124.1	130.8
June	92.8	103.1	101.5	107.5	120.5	118.5	124.1	130.6
July	93.4	104.5	100.3	109.1	121.3	120.5	125.7	130.6
Aug	94.9	106.7	99.7	112.0	120.8	120.8	127.4	131.5
Sept	96.2	107.0	99.9	114.4	120.4	121.3	128.5	131.0
Oct	97.1	106.6	100.2	115.8	120.0	121.7	128.7	131.0p
Nov	98.3	106.3	100.6	116.3	119.5	121.9	128.1	
Dec	99.2	105.9	101.2	118.3	119.6	122.0	128.3	

Official beginning January, 1952 Official Index for these years see the 1926 = 100 wholesale price index discontinued by BLS 1952

Unofficial for

p preliminary

Construction Materials Prices in 21 Cities

Market quotations on construction materials as reported to Engineering News-Record

ENR 21-Cities	CEMENT, Bulk per bbl CL lots, fob city Incl. Dealer Disc 1955 Low	High-Dec	SAND, per ton Truck lots or over fob city 1955 Low	High-Dec	CONCRETE READY MIXED 1:2:4 over 50 cy per cy delivered 1955 Low	High-Dec	BRICK, CLAY BACKING per M quantity delivered 1955 Low	High-Dec	STRUCTURAL CLAY TILE Partition, Score 3 x 12 x 12, per M 2000 pieces or over delivered 1955 Low	High-Dec
Average	3 52	3 56	2 29	2 38	12 38	12 77	33 17	34 88	158 62	167 49
Atlanta	3 56a	3 56a	2 50‡	2 50‡	12 06	12 25	23 50q	30 00q	124 65q	139 75q
Baltimore	3 48ag	3 75a	2 00‡	2 00‡	12 15	12 15	36 00	36 00	186 00	202 00
Birmingham	2 75e	2 75e	2 08	2 08	11 00	11 00	25 50	27 00	126 00q	126 00q
Boston	4 11b	4 11b	2 50	3 00	12 50	13 00	36 85q	36 85q	196 00r	196 00r
Chicago	3 32a	3 32a	3 65‡h	3 75‡h	12 00	13 00	26 00	28 00	135 00	135 00
Cincinnati	3 55c	3 55c	2 24‡i	2 24‡i	11 45	12 10	45 00q	45 00q	185 00r	205 00q
Cleveland	3 34e	3 34e	1 65	1 65	15 50k	16 00k	34 50	39 75	170 00r	187 50s
Dallas	2 85a	2 85a	1 84	1 84	9 40	9 40	19 75	19 75		
Denver	3 94a	3 94a	1 20	1 20	10 50	10 70	34 00	34 00		
Detroit	3 17f	3 30f	4 00‡h	4 00‡h	12 60	12 80	37 50q	40 50q	130 00	189 00
Kansas City	3 80b	3 90b	1 60‡	1 60‡	12 50l	13 00l	28 50	29 25	127 50	127 50
Los Angeles	4 26e	4 46e	2 21‡	2 31‡	11 88m	12 46m	27 50r	27 50r		
Minneapolis	3 79a	3 79a	1 60‡	1 60‡	12 75n	13 25n	35 00q	41 00q	175 00q	181 00q
New Orleans	3 15a	3 15a	2 00	2 00	12 90	12 90	31 00q	31 00q	170 00	170 00
New York	3 85a	3 85a	1 90hj	2 00hj	14 65o	15 50o	41 00	41 00	147 30t	151 90t
Philadelphia	3 60a	3 60a	2 35‡	2 50‡	13 20m	13 20m	32 00	32 00	156 30	156 30
Pittsburgh	3 34a	3 56a	2 20‡	2 20‡	13 00	14 00	36 00	36 00	138 00	138 00
St. Louis	3 38c	3 38c	2 60	2 70	11 90	13 25	41 50	41 50	147 00q	160 50q
San Francisco	3 27c	3 39c	2 47	2 17	12 15p	12 15p	37 00	39 50	156 85uv	156 85uv
Seattle	3 55a	3 55a	3 50‡h	4 00‡h	12 30	13 30	34 00	42 00	223 00q	225 00q
Montreal	2 86d	2 86d	2 25‡	2 25‡	10 55n	10 80n	39 50	39 50	165 00u	165 00u

•‡ delivered •a less 10¢ disc, 15 days •b less 2% disc, 15 days •c less 10¢ disc, 10 days •d truckload lots, deliv., 10¢ disc, 20 days •e truckload lots destination price •f mill price plus freight •g Dec. $3.48 •h per cy •i 5 tons or more •j barge lots asd •k 7 9 mi zone •l 25 cy plus •m 1:2½:3½ •n 2500 lb comp •o 5 cy or more deliv, Manhattan •p 10-100 cy bracket •q truckload •r fob yard •s warehouse deliv •t fob trucks, job site •u smooth •v fob Stockton

LUMBER, No. 2 Common or better, 2x4 s4s

ENR 21-Cities		Short Leaf Yellow Pine 1955 Jan. Low	High	Dec.	1956 Jan.	Nov.	Douglas Fir 1955 Jan. Low	High	Dec.	1956 Jan.	Nov.
Average		95 20	100 97	100 67	101 00	103 13	114 12	121 39	119 04	119 21	117 15
Atlanta	a	72 50j	75 50	75 50	77 50	77 50					
Baltimore	b	84 00k	95 00	95 00	92 00	96 00	118 00	134 00	130 00	130 00	123 00
Birmingham	a	80 50	80 50	80 50	80 50	81 00	108 50	108 50	108 50	108 50	103 50
Boston	b	96 00i	107 00i	105 00i	105 00i	107 00r	115 00c	125 00c	125 00c	125 00c	116 00c
Chicago	d	90 00	96 00	91 00	93 00	93 00	111 00	119 00	114 00	115 00	119 00
Cincinnati	b	80 00	83 00	83 00	83 00	90 00	105 50	135 00	110 00	113 50	107 75
Cleveland	d	96 00	103 00	103 00	98 00	99 00	107 00	118 00	118 00	108 00	113 00
Dallas	a	65 00	72 00	72 00	72 00	75 00					
Denver	b						117 00	121 50	118 75	118 75	135 00
Detroit	e	105 00	108 00	108 00	113 00	114 00	106 50	134 00	125 00	125 00	130 00
Kansas City	b	110 00	125 00	125 00	125 00	120 00	120 00m	135 00	135 00	135 00	125 00
Los Angeles	f						97 00	107 00	162 00	102 00	95 00
Minneapolis	g						140 00n	145 00	140 00	140 00	145 00
New Orleans	a	92 50	94 50	94 50	94 50	96 50	112 00o	121 00	119 00	121 00	103 00
New York	h	122 50	125 00	125 00	122 50	122 00	125 00p	127 50	125 00	125 00	122 50
Philadelphia	e	125 00	127 00	127 00	127 00	127 00	146 50	147 00	147 00	147 00	147 00
Pittsburgh	a	95 00	110 00	110 00	110 00	130 00	125 00	135 00	135 00	135 00	130 00
St. Louis	g	112 00	120 00	120 00	122 00	119 00	122 00	139 50	132 00	134 00	133 00
San Francisco	a						84 00	92 00	86 00	88 00	85 00
Seattle	a						72 50	50 00	72 50	75 00	76 00
Montreal		88 00i	92 00i	92 00i	92 00i	96 00i	155 00q	175 00	170 00	170 00	180 00

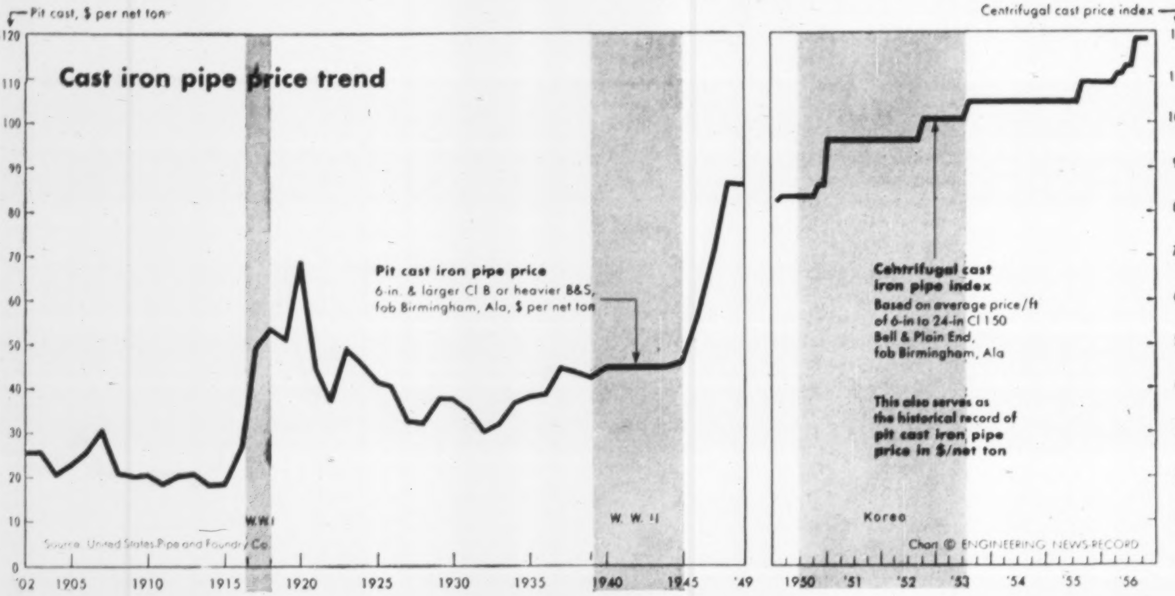
•a fob mill •b fob city, CL out of yard •c asd •d fob city CL dir mill •e deliv to contr •f retail LCL at yard •g retail LCL deliv •h deliv truck lots •i spruce •j Jan $73.50 •k Jan $85 •l Jan $120 •m Jan $129 •n Jan $145 •o Jan $117 •p Jan $127.50 •q Jan $165 •r hemlock

Major Items Included in BLS Building Materials Price Index—1947–49 = 100

	October 15 1947	1948	1949	1950	1953	1954	1955	1956
All Building Materials	97 1	106 6	100 2	115 8	120 0	121 7	128 7	131 0
Lumber & Wood Products								
Douglas Fir	101 8	108 8	93 2	130 0	110 8	127 3	132 4	122 7
Southern Pine	101 0	104 7	96 4	117 8	114 2	112 5	117 0	119 0
Other Softwoods	96 2	109 3	103 2	129 3	132 4	130 7	138 5	133 3
Hardwoods	98 2	108 0	92 2	121 7	115 6	111 6	122 3	123 7
Millwork	93 6	109 8	106 6	122 4	131 2	130 2	128 2	128 6
Plywood, Softwood	88 5	119 7	93 1	122 5	99 0	110 3	110 7	90 2
Plywood, Hardwood	96 1	105 6	92 0	110 1	108 6	100 1	103 4	104 2
Nonmetallic Minerals								
Portland Cement	95 0	105 3	106 4	111 1	124 4	128 3	132 2	141 4
Concrete Ingredients*	95 5	103 8	105 5	108 6	119 4	122 1	125 6	131 6
Concrete Products	96 5	102 2	103 9	108 4	117 4	117 8	120 2	125 0
Plate Glass	96 3	104 4	104 4	120 9	132 0	132 0	137 5	145 7
Window Glass	95 6	105 1	103 9	111 7	131 3	131 3	145 5	145 9
Gypsum Products	98 4	104 1	102 3	107 1	122 1	122 1	122 1	127 1
Prep. Asph. Roofing	94 4	103 6	101 7	101 9	109 9	106 1	114 4	117 5
Struct. Clay Products	94 7	104 8	105 1	117 6	132 0	135 4	144 3	150 1
Insulation Materials	97 9	103 5	97 5	104 1	108 1	110 1	107 1	100 3
Paint & Paint Materials								
Prepared Paints	98 7	101 7	98 0	100 5	112 0	112 8	115 0	122 6
Paint Materials	97 8	103 5	91 2	94 7	98 1	97 2	97 4	98 8
Building Paper & Board	93 2	105 5	103 8	112 7	123 0	127 6	133 3	138 1
Metals & Metal Products								
Structural Shapes	89 9	112 4	112 4	120 4	141 9	146 2	157 5	170 5
Bars, Concrete Reinf	92 5	111 9	111 9	115 2	147 6	156 1	164 3	177 4
Pipe, Black Steel	93 1	108 1	110 1	115 1	138 8	144 0	157 1	176 5
Pipe, Galvanized	92 6	110 7	106 2	115 3	125 9	132 2	141 9	159 9
Cast Iron Soil Pipe	87 1	115 1	107 5	113 6	105 5	108 4	111 3	114 5
Copper Water Tubing	97 5	108 9	93 9	120 4	143 4	136 5	171 7	156 4
Sheets, Galvanized	94 8	109 2	106 6	124 0	129 3	134 4	143 2	153 1
Sheets, Aluminum	94 7	104 9	105 9	118 1	132 6	136 3	146 0	158 6
Metal Doors, Sash, Trim	99 0	102 8	102 8	118 0	127 3	132 5	146 3	148 3
Nails, 8d	86 8	112 0	112 0	114 9	138 5	144 5	159 4	173 7
Building Wire	102 9	116 7	76 7	105 1	107 2	99 1	147 1	152 9
Nonmetal Sheathed Cable	103 3	115 7	73 7	97 4	96 3	87 8	107 1	105 3
Hardware, Finished	98 3	106 3	97 5	118 1	136 6	138 0	143 9	150 2
Plumbing Equipment	97 0	105 1	102 2	116 8	118 5	118 7	129 4	133 9
Heating Equipment	97 3	105 7	102 2	109 8	115 8	114 3	117 3	121 7
Basement Oil Tank	99 8	111 6	84 0	99 6	106 0	98 5	117 5	134 8
Machinery								
Elevators & Escalators	96 5	104 9	105 1	105 0	116 5	118 4	123 0	132 2
Fans and Blowers	88 5	104 7	113 7	129 6	143 7	143 7	157 4	171 3
Incandescent Lamps	95 9	104 6	104 6	121 9	136 9	136 9	147 2	145 0

* Includes Portland cement

(Continued on page 152)



Pipe Price Trends In 20 Cities, 1950-56

Figures in table are Price Indexes for Centrifugal Cast Iron Pipe,* with carload freight allowed to city, which also serve as the historical record of the $ Per Net Ton Price of Class B Pit Cast Pipe.

	1/'50	2/'50-9/'50	10/'50-11/'50	12/'50-3/'51	4/'51-7/'51	8/'51-4/'52	5/'52-8/'52	9/'52-6/'53	7/'53-12/'53	1/'54-4/'55	5/'55-7/'55	8/'55-9/'55	10/'55	11/'55-2/'56	3/'56	4/'56	5/'56-6/'56	7/'56-9/'56
Atlanta	88.3	89.2	92.0	101.8	101.9	102.2	102.7	107.6	111.0	109.6	109.6	113.6	113.6	113.6	115.6	115.8	117.6	123.5
Baltimore	94.1	96.1	101.6	111.6	111.6	112.2	112.6	117.2	120.9	120.9	117.9	122.9	122.9	122.9	124.9	125.2	127.1	132.9
Birmingham	82.5	83.4	86.2	96.0	96.0	96.0	96.0	100.9	104.3	104.3	104.3	109.3	109.3	109.3	111.3	111.3	113.1	119.0
Boston	97.9	99.9	105.4	115.2	115.2	116.1	116.8	121.4	125.1	125.1	120.5	125.5	125.5	125.5	127.5	127.9	129.8	135.6
Chicago	97.0	97.9	100.7	110.5	110.8	111.4	112.7	117.6	121.0	121.0	121.0	126.0	122.9	122.9	124.9	125.7	127.5	133.4
Cincinnati	92.8	93.7	96.5	106.3	106.5	106.9	107.8	112.7	116.1	114.5	114.5	119.5	118.0	118.0	120.0	120.5	122.3	128.2
Cleveland	97.7	98.6	101.4	111.2	111.5	112.1	113.5	118.4	121.8	121.8	121.8	126.8	123.6	123.6	125.6	126.5	128.3	134.2
Dallas	96.7	97.6	100.4	110.2	110.5	111.1	112.4	117.3	120.7	120.7	120.7	125.7	125.7	120.1	122.1	122.8	124.6	130.5
Denver	101.2	102.1	104.9	114.7	115.1	116.1	118.1	123.0	126.4	126.4	126.4	131.4	131.4	129.0	131.0	132.4	134.2	140.1
Detroit	97.7	98.6	101.4	111.2	111.5	112.1	113.5	118.4	121.8	121.8	121.8	126.8	123.9	123.9	125.9	126.8	128.6	134.5
Kansas City	95.9	96.8	99.6	109.4	109.6	110.2	111.4	116.3	119.7	119.7	119.7	124.7	124.7	120.7	122.7	123.4	125.2	131.1
Los Angeles	99.4	100.3	103.1	113.7	114.2	115.2	116.5	121.4	125.4	125.4	126.1	131.1	131.1	131.1	133.1	134.8	134.8	140.2
Minneapolis	101.4	102.3	105.1	114.9	115.2	116.0	117.7	122.6	126.0	126.0	126.0	131.0	131.0	131.0	133.0	134.3	136.1	142.0
New Orleans	91.0	91.9	94.7	104.5	104.6	105.0	105.7	110.6	114.0	112.5	112.5	116.0	116.0	116.0	118.0	118.4	120.2	126.1
New York	93.1	95.1	100.6	110.4	110.4	110.3	110.6	115.2	118.9	118.9	116.5	121.5	121.5	121.5	123.5	123.7	125.6	131.4
Philadelphia	90.5	92.5	98.0	98.0	98.0	107.4	107.6	112.2	115.9	115.9	115.9	120.9	120.9	120.9	122.9	123.1	125.0	130.8
Pittsburgh	98.3	99.2	102.0	111.8	112.2	112.8	114.2	119.1	122.5	122.5	122.5	127.5	124.7	124.7	126.7	127.6	129.4	135.3
St. Louis	92.3	93.2	96.0	105.8	106.0	106.4	107.2	112.1	115.5	114.1	115.5	120.5	119.3	119.3	121.3	121.9	123.7	129.6
San Francisco	99.7	100.6	103.4	113.9	114.2	115.2	116.5	121.4	125.4	125.4	126.1	131.1	131.1	131.1	133.1	134.8	134.8	140.2
Seattle	99.7	100.6	103.4	113.9	114.2	115.2	117.1	122.0	125.4	125.4	126.1	131.1	131.1	131.1	133.1	135.4	135.4	140.8

* Based on average price per ft of 6-in. to 24-in. sizes Class 150 Federal Specification WW-P-421 Bell & Plain End Centrifugal Pipe in 18-ft. lengths for period January 1950 through December 1954. Beginning January 1955, based on same sizes but for Class 150 Standard Conditions Pipe, Federal Specification WW-P-421a and ASA Specifications A21.6 (AWWA C-106.)

Source: United States Pipe and Foundry Co.

Cast iron pipe prices during 1956 rose at the fastest pace since the early months of the Korean War in 1950. The rise was 8% or more between September 1955 and September '56 in several eastern and southern cities and from 4% to 7% in other key cities across the country, according to the Centrifugal Cast Iron Pipe Price Index computed by the United States Pipe and Foundry Co.

This Index, computed monthly for 20 U.S. cities, has a double use because it measures the price trend for centrifugal cast iron pipe, f.o.b. city, and it also represents the historical price in $ per ton for Class B pit cast pipe, f.o.b. each city.

The figures in the table above link at January, 1950 with Class B pit cast prices in 20 cities, published monthly in the ENR Materials Price Report.

Prices for Birmingham, Ala., from 1902 to date are shown in the chart above; average annual prices from 1902-49 are in the table at the right.

The Cast Iron Pipe Price Index is calculated from the average price per foot, f.o.b. city, of centrifugal cast pipe. Sizes from 6-in. to 24-in., Class 150 Federal Specification WW-P-421 Bell & Plain End, in 18-ft. lengths are used. This average is multiplied by the factor of 2.27 to get the price index for the months January, 1950, through December, 1954. Beginning January, 1955, a change to Federal Specification WW-P-421a and the wider use of ASA Specifications A 21.6 (AWWA C-106) the index is computed by substituting Class 150 Standard Conditions Pipe and multiplying by a factor of 2.44.

Cast Iron Pipe Prices 1902-49

Pit cast, 6" & larger, C1 B or heavier B&S, fob Birmingham, Ala.

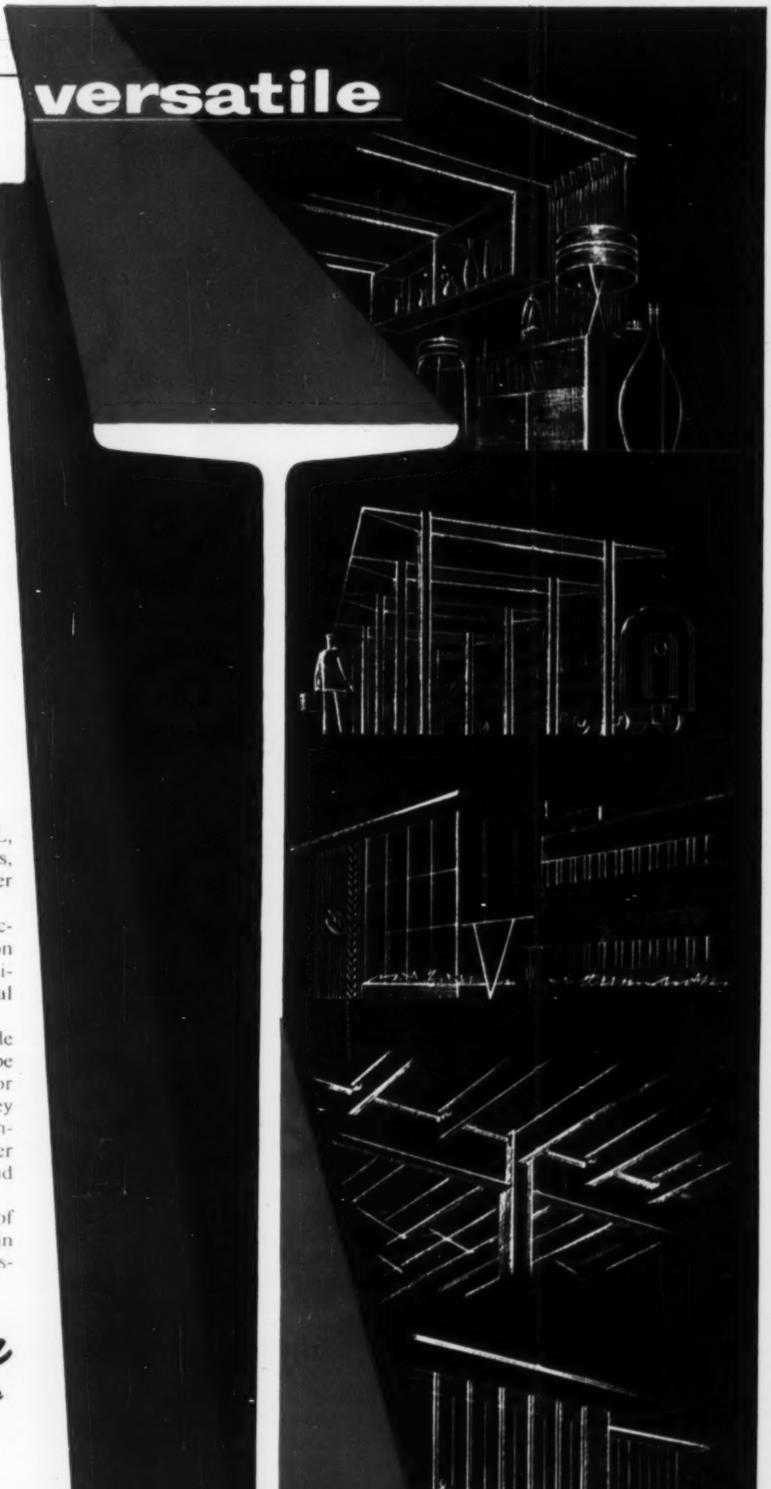
Year	$/ton	Year	$ ton
1902	25.83	**1926**	40.67
'03	25.85	**'27**	32.88
'04	20.13	**'28**	32.46
1905	22.79	**'29**	38.00
'06	25.46	**1930**	38.00
'07	30.75	**'31**	35.46
'08	21.08	**'32**	30.50
'09	20.46	**33**	32.25
1910	20.92	**'34**	37.00
'11	18.92	**1935**	38.58
'12	20.46	**'36**	39.00
'13	21.00	**'37**	44.75
'14	18.58	**'38**	44.00
1915	18.89	**'39**	42.75
'16	26.16	**1940**	45.00
'17	49.68	**'41**	45.00
'18	53.85	**'42**	45.00
'19	51.17	**'43**	45.00
1920	68.92	**'44**	45.00
'21	44.50	**1945**	46.00
'22	37.33	**'46**	56.83
'23	49.17	**'47**	70.96
'24	45.88	**'48**	86.83
1925	41.67	**1949**	86.17

(*Continued on page 155*)

strong

versatile

economical



Lightweight

J&L JUNIOR BEAMS

Junior Beams, produced exclusively by J&L, can help you cut building costs in schools, apartment buildings, warehouses and other light occupancy structures.

The lightest hot rolled structural steel section available, Junior Beams speed erection because they can be easily raised and positioned with minimum manpower and material handling equipment.

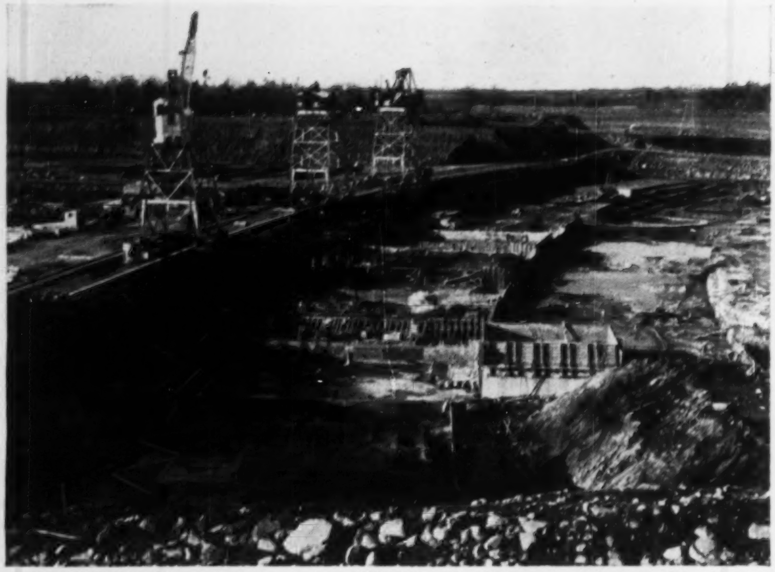
Junior Beams may be adapted to a wide range of architectural design. They can be framed-in, used as a continuous member, or cantilevered beyond supporting walls. They are not only suitable for floor and roof construction but can be used for numerous other applications such as shipbuilding, truck and trailer frames and grandstands.

For complete information on the uses of J&L Junior Beams, write Jones & Laughlin Steel Corporation, 428 Gateway Center, Pittsburgh 30, Pa.

Jones & Laughlin

STEEL CORPORATION — *Pittsburgh*

STEEL



FOUNDATION of Long Sault Dam where 700,000 yards of concrete will be poured by the contractor—Walsh, Perini, Morrison, Kiewit, Utah Companies, Massena, New York.

AGGREGATE TUNNEL CUTS COST OF VOLUME CONCRETE MIXING... ST. LAWRENCE SEAWAY PROJECT

Material handling is a major problem on projects such as the Long Sault Dam on the new St. Lawrence Seaway. Here is a job of such magnitude as to require more than 2400 cubic yards of concrete per day to keep the work rolling.

To handle the necessary aggregates, the contractor constructed, at some distance from the dam site, a tunnel within which a conveyor carries the aggregate to a batch concrete mixer. This tunnel, built right on the job with Commercial Shearing and Stamping steel liner plates, is large enough to accommodate the conveyor belt and walkway for feeder operators.

Placed at intervals in the tunnel roof are openings through which the aggregate flows by gravity from the stockpile directly overhead and which completely covers the tunnel. Feeders installed at intervals in the tunnel roof control the gravity flow of the aggregate from above.

Feeder operators working inside the tunnel control the material flow and selection of sizes to obtain the proper aggregate mixture reaching the conveyor. The belt carries the aggregate to the batch mixer for the addition of cement, water and mixing into concrete.

Commercial Shearing and Stamping liner plate was selected for this job because of its ability to withstand the most severe overhead loads, and to provide maximum protection from collapse and cave-in. In addition, the ease of constructing and disassembling Commercial liner plate tunnels make it possible to move or salvage the entire tunnel. This method of large scale aggregate handling, as done at the Long Sault Dam project, is being profitably used by contractors on other major projects.

Commercial Shearing and Stamping steel liner plate is available in a wide size and gauge range. For complete details on how Commercial can help solve your surface or sub-surface tunnel problems write to Dept. E-51, The Commercial Shearing and Stamping Company, Youngstown, Ohio.

COMMERCIAL shearing and stamping

YOUNGSTOWN, OHIO
CHICAGO, ILLINOIS
SALT LAKE CITY, UTAH

CONSTRUCTION of aggregate tunnel is quick and simple. Workmen install Commercial's liner plates on this concrete foundation in trench.

TUNNEL is completed. Unskilled workmen have used only 7 inside bolts to hold each plate. Note aggregate feeder openings.

AGGREGATE, stockpiled on top of tunnel, flows by gravity onto belt conveyor inside tunnel as operators open feeder gates.

CONVEYOR emerges from tunnel (foreground) and feeds aggregate into batch mixer for final processing into concrete. Trucks then haul concrete to dam site without time loss.

Materials Prices

November Market Quotations by ENR Field Reporters

CEMENT, AGGREGATE, READY-MIXED CONCRETE—F. O. B. CITY

	PORTLAND CEMENT* Per bbl. C/L lots cash, dis. not deducted			SAND AND GRAVEL Per ton, carload lots			CRUSHED STONE Per ton, carload lots		CRUSHED SLAG Per ton, carload lots, f.o.b. plant		CONCRETE BLOCK 8x8x16-in.* truckload del.* per block		CONCRETE Ready Mixed 1:2:4 del. 50 cy & over
	Paper	Bulk	Mortar	Gravel, 1½ in.	Gravel, ¾ in.	Sand	1½ in.	¾ in.	1½ in.	¾ in.	Sand grav.	Lt. wgt. agg	
Atlanta	$4.12a	$3.71a	$3.55	$2.75	$2.75	$2.50‡	$2.14	$2.24	$1.45	$1.65	$0.19	$	$13.75g
Baltimore	4.23c	3.82c	3.61c	2.80‡a	2.80‡a	2.25‡a	2.85‡a	2.90‡a	2.05‡a	2.00‡a	.18	.18a	12.75
Birmingham	3.73	3.00af	....	2.53n	2.53n	2.13n	2.75	2.75	1.55	1.65	.18	.18	12.30
Boston	4.91be	4.44a	4.71e	3.00a	3.00a	3.00a	1.65a	1.75a			.23	.275a	14.00h
Chicago	3.98a	3.57a	3.72	3.78‡b	3.78‡b	4.13‡b	3.95‡b	3.95‡b	2.25‡	2.25‡	.25	.25b	13.50
Cincinnati	4.22c	3.81c	3.90	2.19‡c	2.24‡c	2.24‡*	2.54‡c	2.54‡c		....	.205	.25a	12.40
Cleveland	N.A. in C.L.	3.59	....	2.15ef	1.95f	1.65	4.30‡a	4.30‡a	3.30‡a	3.30‡*	....	.23	16.15
Dallas	3.35a	2.95a	3.23	2.42	2.53	1.84	2.22	2.38	....	....	.11e	.2675	11.25
Denver	4.59a	4.09a	4.59	1.90	2.05	1.20				....	.22	.245a	10.70
Detroit	4.10a	3.45a*	3.73	4.25‡b	4.25‡b	4.00‡b	3.75‡	3.75‡	3.50‡	3.50‡	.23	.22a	14.20
Kansas City	4.30b	4.10b	4.10			1.70‡a	2.00‡a	2.00‡a	....	....	.20a	.24c	13.50b
Los Angeles	5.12ch	4.66ch	5.60	2.41‡a	2.76‡a	2.41‡a	2.41‡a	2.46‡a	....	....	.145fm	.255m	12.96h
Minneapolis	4.49a	4.08a	3.99	2.70‡ag	2.70‡ag	1.60‡ag	3.25‡ag	3.25‡ag	....	....	.19	....	14.00f
Montreal	3.11d	2.86d	3.50	1.95‡a	2.20‡a	2.25‡a	1.95‡i	2.20‡i	....	....	.20	.20a	10.80ek
New Orleans	3.70a	3.45a	3.75	2.44	2.44	2.00			1.45	1.65	.275	....	13.65
New York	4.56a	4.15a	3.88	3.05bk	3.05bk	2.15bk	2.90bl	2.90bl	....	....	.25	.30	16.00an
Philadelphia	4.03/4.42‡a	3.72/4.09‡a	3.64/4.27‡	2.85‡op	2.85‡op	2.35‡op	2.70‡	2.80‡	2.00	2.35	.23/.29	....	15.40de
Pittsburgh	4.15a	3.76a	3.75	2.40‡	2.40‡	2.20‡	2.60‡	2.60‡	2.15	2.15	.25d	.31	14.00
St. Louis	3.86/4.18e	3.46/3.78e	3.71/4.03	3.25am	3.10am	2.40/3.10am	1.60j	1.70j	....	....	.22	.28c	12.40/12.90
San Francisco	3.79e	3.39e	....	2.02	2.02	2.12	2.17	2.17	....	....	.24	.28cl	12.50c
Seattle	4.30a	3.75a	....	4.00‡bm	4.00‡bm	4.00‡bm	4.50‡bm	4.50‡bm	....	....	.26	.37	13.30j
Toronto	4.00	4.00	4.00	2.30‡	2.30‡	2.00‡	2.05	2.05	2.05	2.05	.25	.29c	15.05

‡ Delivered. * Prices incl. dealers discount except as noted.

CEMENT: *a Less 10¢ disc, 15 days. *b Less 2% disc, 15 days. *c Less 10¢ disc, 10 days. *d Truckload lots, deliv. 10¢ disc, 20 days. *e Truckload lots *f Fob mill, add $13.11 to $19.16 per car switching charges *g fob mill + freight *h LCL.

SAND GRAVEL, STONE & SLAG: *a Truck lots. *b Per cu. yd. *c 5 tons or more. *e ½". *f Pea gravel. *g Less 5% for cash. *h Less than 5 tons. *i Plus 5% mun. & prov. tax *j F.o.b. quarry. *k Barge lots asd. *l F.o.b. scow Hudson river. *m Less 2% for cash. *n F.o.b. cars. *o 1-3 mi zone. *p Add 10¢ for ea. add'l mi zone.

CONCRETE BLOCK: *a Cinder *b Waylite. *c Haydite. *d Celocrete *e 5¼ x 8 x 12 in. *f 8 x 4 x 16. *g F.o.b. truck at job. *i Less 2% for cash *l F.o.b. plant San Rafael. *m F.o.b. yard.

READY MIXED CONCRETE: *a 5 cu. yds. or over del. Man. *b 25 cu. yds or more *c 10-100 cy. brackets. *d 1-3 mi. zone. *e 2,000 lb comp. *f 2,500 lb. comp. *g Less 25¢ disc, 15 days. *h Less 50¢ for cash. *i 5% off for cash. *j 2% off for cash. *k Federal tax included. Add 5% mun. & prov. *l 1:2½:3½. *m F.o.b. yard *n Plus escalator clause. *o Add 15¢ for ea. add'l 3-mi zone.

CASH DISCOUNTS CEMENT to Contractors: Truck delivery, 2% for cash on 10th of month; on carload deliveries, no trucking, same as dealer cash discount 10¢ per bbl. for payment within 15 days of date of invoice. Subject discount 10¢ per bbl. 20 days in Montreal.

CURRENT MAXIMUM PRICES AT CEMENT MILLS

Charge for bags not included. For paper bags add 40¢ per bbl., not refundable.

	Bulk		Bulk		Bulk		Bulk		Bulk
Richard City, Tenn	$3.15†	Buffington, Ind	$3.10†	Steelton, Minn	$3.20†	Muskegon, Mich	$3.15†	Toledo, O	$3.15†
Clinchfield, Ga	3.15†	Independence, Kan	2.95†	Leeds, Ala	3.00†	Saginaw, Mich	3.15†	Milwaukee, Wis	3.20†
Kingsport, Tenn	3.15†	Hannibal, Mo	3.10†	Duluth, Minn	3.20†	Wyandotte, Mich	3.15†	Green Bay, Wis	3.20†
West Des Moines, Iowa	3.20†	Northampton, Pa	3.20†	Hudson, N. Y	3.20†	Buffalo, N. Y	3.25†	Ironton, O	3.15†
Nazareth, Pa	3.20†	Universal, Pa	3.20†	Alpena, Mich	3.05†	Oswego, N. Y	3.30†	Montreal City	2.56†
Bath, Pa	3.20†	Waco, Tex. (+ 10¢ tax)	3.10†	Detroit, Mich	3.15†	Cleveland, O	3.20†	W. Winfield, Pa	3.20†
Lesley, Pa	3.20†	Giant, S. C	3.25†	Howes Cave, N. Y	3.20†	Alsen, N. Y	3.20†	Security, Md	3.20†

† *Prices to hold for Fourth quarter of 1956.*

PAVING BRICK, BLOCK, ASPHALT, ROAD OILS—F. O. B. CITY

	PAVING BRICK AND BLOCK			PAVING ASPHALT Per ton, less than 80 penetration		ASPHALT BINDERS FLUXES Per gal., 80-300 penetration		CUTBACK ASPHALT MC per ton		ROAD OIL	ASPHALT EMULSION RSI Per gal.	
	Granite Per M lots of 50,000 4x4x8 in.	Brick per M 3x4x8½ in. carload lots	Wood per sq. yd. 3½ in. 16-lb. treat	Tank car	Drums	Tank car	Drums	Tank car	Drums	Per gal. Tank car	Tank car	Drums
Atlanta	....	....	....	$27.60	$40.00	$0.15	$0.25	$0.114Pw	$0.276Pw	$0.15	$0.15	$0.25
Baltimore	150.00‡		....	23.00i	....	.095i	0.185i	.10iwE	.19iwE	.10i	.105i	0.195i
Birmingham	....	62.00i	....	....	....	....	....	....	....	....	....	....
Boston	....	....	....	22.00ap	35.00ap	22.00as	30.00as	.095aFw	.195*Fw	.095a	.095aG	.175aG
Chicago	150.00‡	85.00‡b	3.95/4.00‡j	21.85b	31.85b	20.85bs	30.85bs	.106wH	.186wH	.085	....	....
Cincinnati	....			....	....	....	....	....	....	....	....	....
Cleveland	....	82.00d	6.30g	23.00A		23.00A	....	.1025AwF	....	....	.1025AG	.20AG
Dallas	e	40.00	e	25.20	44.29	.1066	.1894	28.55	50.08	.1030	.1066	.1894
Denver	....	50.00	....									
Detroit	....	112.00	....	29.65	....	29.65s	....	.1285wI	....	.1026	....	.25
Kansas City	e	e	e	7.00cl	....	18.60s	....	.085*wJ	....	.078c	0.128	....
Los Angeles	e	....	e	18.50dmz	....	18.50dsz	....	20.00dzK	....	19.00ds	.09j	.19j
Minneapolis	....	....	3.73h	26.50		26.50	....	0.115w		0.105	.1242	
Montreal	e	e	e	27.00n	39.60n	.135n	.198n	16.90nuE	20.90nuE	.132n	.197ns	.239ns
New Orleans	....	....	....	17.60e	....o	17.60es	....o	.085ew	....o	.085B	.09BL	....
New York	....	....	3.70f	23.89qCD	44.56qD	23.89stCD	44.56stD	.1073wCDF	.1939wDF	....	.1073CD	.1939D
Philadelphia	175/185	110/120	4.06	22.00	....	22.00	....	.095uF		.095	....	
Pittsburgh	165.00	48.00	4.60	27.00	38.00	.10	.21	27.00E	40.00E	.098	.11	.224
St. Louis	....	....	....	20.63O	....	.1764	....	.0925fwM	....	0.16	.105	....
San Francisco	....	70.00c	....	20.50g	37.50g	20.50gks	37.50gks	21.50gN	39.00gN	21.25s*	.0925y	.1825*
Seattle	....	....	....	24.50z	38.50h	18.75hs		26.00K		22.25hs	.0925h	.1025hr
Toronto	....	....	4.40	34.20	59.66	0.19	0.24	0.20w	0.25w	0.20	0.20	.24

‡ Delivered.

PAVING BRICK & BLOCK: *a CL. *b 3 x 4 x 8. *c 2¼ x 8¼ x 4. *d LCL, truck deliveries. *e Not used. *f 2" interior 8# treat. *g 3" *h 2" tr, 8# *i 3 x 3⅝ x 8½. *j 2½", 8 lb. tr.

ASPHALTS: *a Price at plant, Everett, Mass. *b F.o.b. refinery, Lockport, Ill. *c F.o.b. Sugar Creek, Mo. *d F.o.b. refinery, El Segunda. *e F.o.b. Baton Rouge. *f F.o.b. Hartford, Ill. *g F.o.b. Richmond, Calif. *h F.o.b. Martinez. *i F.o.b. refinery, Baltimore. *j F.o.b. refinery, Inglewood, Calif. *k 50-110 penetr. *l Less than 100 penetr. *m 40-80 penetr. *n Fed. tax included; add 5% for mun. & prov. *o Drums not avail. Shipped in steel bbl. *p 60/70 penetr. *q 40/85 penetr. *r In customer's drums. *s Shipped in drums, per drum. *t 85/200 penetr. *u Per 100 gal. *v Per ton. *w Per gal. *x Also tank trucks. *y F.o.b. Oakland *z F.o.b. Edmonds *A F.o.b. refinery, Cleveland. *B F.o.b. Destrehan, La. *C Bulk. *D Prices based on transporting to Manhattan via truck. *E RC. *F Also RC. *G Also MS, SS. *H RC 0-5 incl. *I MC 4. *J MC, RC .0675. *K MC 3, 4 & 5. *L MS. *M MC 1-5, RC 1-5, .089. *N MC 3. *O fob Roxanna, Ill *P F.o.b. refinery Savannah; $0.09/gal., tank cars; $0.20/gal., drums.

• Next Report: See ENR Jan. 10, 1957

Continued on page 159

In place of wasteful and uncertain crankcase-oil changing based upon mileage or hours in service, many operators of heavy-duty construction equipment now use a better guide that saves them both time and money.

Now you can test used oil in minutes

IT HAS COME as something of a surprise to some maintenance men to discover that they have been throwing away hundreds of gallons of still-good oil . . . year after year. Conversely, it is quite a jolt to realize that a costly engine-repair job could have been prevented by an on-the-spot analysis that would have shown up the condition . . . in minutes!

The recommendations for oil changes issued by engine makers have always been computed on "averages" for the various classes of vehicle service. And like the "average" man on the insurance chart, the average vehicle doesn't exist in the actual fleet. For example, two bulldozers of the same make and model, operating on the same job, can have quite different patterns of oil economy and engine condition. Obviously no one set of rules can apply ideally to all units. And fortunately there is no longer any need for such generalization.

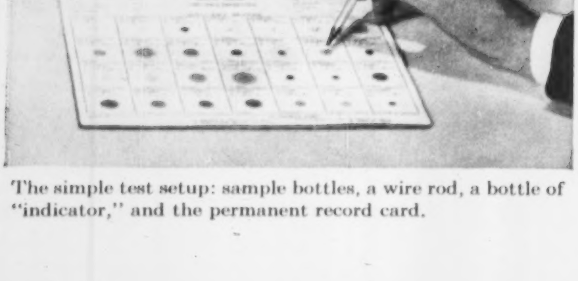
From a couple of drops of used oil, the Shell "ADC* Oilprint Analysis" provides a reliable check of oil condition, in minutes. It is very simple, and with a little practice, it tells you a lot about that oil and the engine that uses it.

What a drop of used oil shows: You place a drop of used oil on a piece of special filter paper supplied by Shell . . . let it stand a minute or two. You will then be able to *see* the following:

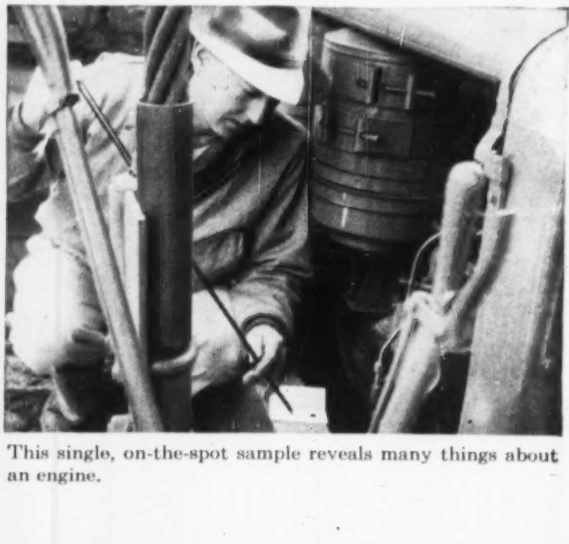
Water dilution: Even a tiny amount of water shows up . . . and that means not only that your oil is losing its ability to protect engine parts, but it also shows whether the water represents a normal amount of condensation or something more serious, such as an actual leakage of coolant from a faulty jacket.

Dispersancy/detergency: The same oil drop will give you a picture of how well the special additives in the oil are doing their job . . . whether or not the contaminants are being held in suspension where they do least harm . . . whether the cleansing and dispersing actions are adequate . . . whether the oil is still good.

Adulteration: The color of the oil spot will show whether too much contamination is occurring . . . and will very often point up the cause, indicating a check on



The simple test setup: sample bottles, a wire rod, a bottle of "indicator," and the permanent record card.



This single, on-the-spot sample reveals many things about an engine.

A fleet superintendent sees how easily the test is made.

injectors, nozzles, oil and air filters of diesels, or on plugs, carburetors and filters of gasoline engines.

All of the above can be learned from the single drop of oil . . . in an amazingly short time.

Alkalinity: Engine wear and engine deposits increase as the oil becomes acidic in nature due to contamination from combustion products. A special indicating fluid, developed in Shell Laboratories, tells at a glance whether oil is alkaline and still usable, or acid *and how much.*

Operators who keep an ADC Oilprint Analysis record of each vehicle generally find that the crankcase oil stands up longer than they had figured . . . a distinct saving in lubrication cost. At the same time, there is a running check on each engine that often detects impending trouble before its correction becomes costly. In this respect, the Shell ADC Oilprint Analysis qualifies definitely as one of the valuable recent tools of preventive maintenance.

If you are concerned with extending the service of crankcase oil, and with avoiding the risk of using oils loaded with contaminants, we suggest that you have one of the Shell service engineers demonstrate ADC Oilprint Analysis for you.

*Trademark

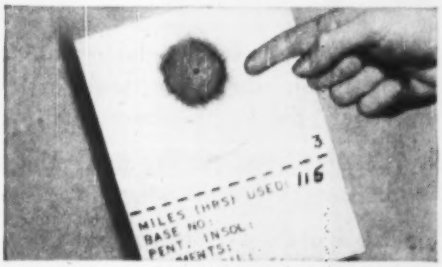


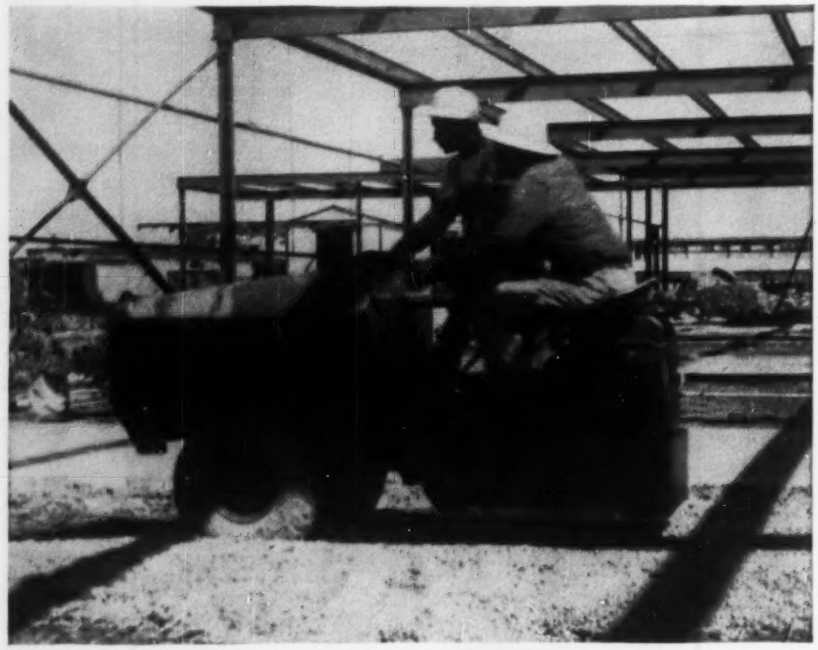
Photo shows an oil-spot test card...one phase in the visual life record of a charge of oil.

The Shell "indicator" shows acidity instantly. If spot turns red, oil is no longer fit to use, should be changed quickly.

SHELL OIL COMPANY

50 WEST 50TH STREET, NEW YORK 20, NEW YORK
100 BUSH STREET, SAN FRANCISCO 6, CALIFORNIA

SHELL



PRIME-MOVER M30 FOR ENGINEERED CONSTRUCTION

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Hauls 2/3 of a yard or 1½ tons. Unloads transit mixers fast and spots concrete right where it's needed.

Simple to operate — just set the directional change lever in forward or reverse and step on the gas. *Hydraulic torque converter drive* frees the operator from shifting, clutching, and wasted effort. Rugged, dependable, and built to last.

Available with flatbed, also. See one of the distributors listed at right for details. The Prime-Mover Co., Muscatine, Iowa.

PRIME-MOVER

PRIME-MOVER M15A FOR BUILDING CONSTRUCTION

The established method of placing materials on school, hospital, and commercial building projects. Places 12 to 17 cu. yds. of concrete per hour — *without* extensive preparation for its use. Runs on same type of ramps, hoists and runways as hand carts. Available with flatbed, or 10 cu. ft. bucket.

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ALA.	Brady Co., Birmingham Ray-Brooks Co., Montgomery — Mobile
ARIZ.	Equip. Sales Co., Phoenix
ARK.	R. A. Young & Sons, Little Rock
CAL.	Essick Mcy. Co., Los Angeles Ricker Mcy. Co., Oakland
COLO.	Corson Mcy. Co., Denver
CONN.	T. B. Holmes & Sons, Hartford
FLA.	M. D. Moody & Sons, Jacksonville — Tampa Highway Equip. Co., Orlando
GA.	R. S. Armstrong & Bro., Atlanta
IDAHO	The Sawtooth Co., Boise
ILL.	Arrow Cont. Equip., Chicago C. C. Hubbard Co., Decatur
IND.	Stockberger Mcy. Inc., Ft. Wayne Ram Tool Co., Indianapolis
IOWA	Gierke-Robinson Co., Davenport Mainline Equip. Co., Des Moines Pecaut Ind. Supply, Sioux City
KAN.	Vic. L. Phillips Co., Kansas City — Wichita
KY.	Cont. Equip. & Truck, Lexington
LA.	So. States Equip., New Orleans So. Equip. & Tract., Baton R. — Monroe
ME.	Stanley & Cadigan, Portland
MD.	S. M. Christhilf, Baltimore
MASS.	Bldrs. Equip. & Supply, W. Medford
MICH.	Cont. Mcy. Co., Detroit — Gr. Rapids
MINN.	Wm. H. Zeigler Co., Minneapolis
MO.	O. B. Avery Co., St. Louis
MONT.	Ind. Equip. Co., Billings Normont Equip., Gr. Falls Treasure State Equip., Kalispell
NEB.	Fuchs-Clayton Mcy., Omaha
NEV.	Pioneer Equip. Co., Reno
N. H.	Scott Machinery, Concord
N. J.	Contractors Supply, Englewood
N. M.	J. D. Coggins Co., Albuquerque
N. Y.	Contractors Supply, Long Island City Dow & Co., Buffalo — Rochester Vans Equip., Rensselaer Midstate Cont. Equip., Syracuse Vincent S. Jerry Co., Plattsburg
N. C.	A. E. Finley Assoc., Raleigh
N. D.	Midwest Equip. Co., Fargo — Bismarck
OHIO	W. T. Walsh Co., Cleveland Lorenz Equip. Co., Columbus Flack Equip. Co., Toledo Rish Equip. Co., Cinn. — Dayton Bischoff Mcy., Gallipolis
OKLA.	R. A. Young & Sons, Tulsa
ORE.	Loggers & Cont. Mcy., Portland
PA.	Furnival Mcy. Co., Phila. — Harris. Anderson Equip. Co., Pittsburgh
R. I.	Bldrs. Equip. & Supply, Providence
S. C.	Van Lott, Inc., W. Columbia
S. D.	Pecaut Equip. Co., Sioux Falls
TENN.	Tri-State Equip., Memphis Nixon Mcy. Co., Chatt. — Knox. McCarthy-Jones-Woodard, Nashville
TEXAS	F. M. Equip., Dallas — Lubbock J. W. Chumley Co., Houston Border Mcy. Co., El Paso Askew Equip., San Antonio
UTAH	Rocky Mtn. Mcy., Salt Lake City
VT.	Reynolds & Son, Barre
VA.	Rish Equip. Co., Rich. — Roan.
WASH.	Universal Equip. Co., Seattle Anderson Equip. Serv., Spokane
W. VA.	Rish Equip. Co., Charl. — Clark.
WIS.	Hunter Tractor & Mcy., Milw.
CANADA	Gen. Supply, Montreal Gen. Supply, Ottawa, Toronto Howard F. Powell, Winnipeg Western Tractor, Regina — Sask. Purves Ritchie Ltd., Calgary Purves Ritchie Ltd., Vancouver Mar. Newfnd. Agencies, Halifax
ALASKA	Northern Commercial Co., Anchorage — Fairbanks — Juneau — Ketchikan — Nome

Materials Prices November Market Quotations by ENR Field Reporters

IRON AND STEEL PRODUCTS—PER 100 LBS. BASE MILL PRICES

	STRUCT SHAPES	PLATE CARBON STEEL	REINF BARS billet	RIVETS ½-in. structural	SHEET PILING Base	STEEL RAILS Per Net Ton Standard	STEEL RAILS Per Net Ton Light	TRACK SUPPLIES Angle Bars	TRACK SUPPLIES Std Spikes	TRACK SUPPLIES Tie Plates	TRACK SUPPLIES Track Bolts
Birmingham Area	$5.00	$4.85	$5.075	$10.85	......	$101.50	$120.00	$6.35	$8.775	$6.025	......
Chicago Area	5.00	4.85	5.075	10.85	$5.90	101.50	120.00	6.35	8.775	6.025	......
Pittsburgh Area	5.00	4.85	5.075	10.85	5.90	101.50	120.00	6.35	8.775	6.025	$13.10
Buffalo Area	5.00	4.85	5.075	10.85	5.90	101.50	120.00	6.35	8.775	6.025	13.10
Cleveland	......	......	5.075	10.85	5.90	......	......	......	......	......	13.10
Youngstown Area	......	......	5.075	......	......	......	......	......	8.775	......	......
Geneva	5.00	4.85	5.175	......	......	......	......	......	......	......	......
Los Angeles	5.70	......	5.775	......	5.90	......	......	......	8.775	......	......
Pueblo	......	......	......	......	......	......	......	6.35	8.775	6.025	......

IRON AND STEEL PRODUCTS—F.O.B. WAREHOUSE, PER 100 LBS., BASE PRICE

	STRUCTURAL SHAPES Per 100 lb. base price	REINFORCING BARS Per 100 lb., base price 5 tons to carload lot New billet	REINFORCING BARS Rail steel	EXPANDED METAL LATHk Per 100 sq. yd., carload lots Std. diamond mesh. 3.4 lb.	EXPANDED METAL LATHk Std. ribbed 3.4 lb.
Atlanta	$11.50	....	$8.90‡	$49.50	$54.00
Baltimore	8.67	8.10j	....	42.00	46.50
Birmingham	8.05t	7.91t	7.91t	65.00p	71.00p
Boston	8.90a	8.47	8.47	50.90	55.85
Chicago	8.05	6.81gu	6.81gu	49.00‡	60.00‡
Cincinnati	8.70ak	7.69rv	....	45.00mn	49.50mn
Cleveland	8.38	6.79c	....	43.50‡	48.00‡
Dallas	9.45	8.25	8.25	49.00	52.00
Denver	9.60	8.45c	....	57.00n	63.00n
Detroit	8.55	8.13	....	56.00	63.00
Kansas City	8.87a	8.73	....	49.00	60.00
Los Angeles	8.70fd	7.35	....	57.50	63.50
Minneapolis	8.45d	8.76b	8.76b	45.00*	49.50*
Montreal	8–8.75iC/8.05–8.45A	7.75/8.95h	7.75/8.95	65.70h	70.20h
New Orleans	....	7.65aks	....	45.50	50.00
New York	8.71	7.93y	7.93y	47.50mo	54.50mo
Philadelphia	8.04	7.14	....	42.50‡	47.00‡
Pittsburgh	7.43	6.57**	....	42.50	47.00
St. Louis	8.48s	7.90c	7.90c	59.50l	61.50l
San Francisco	8.95	8.90j	....	47.50	53.00
Seattle	9.15	8.35e	....	62.00nr	68.00nr
Toronto	8.45*	7.60	7.60	56.00nq	59.00nq

Quantity extras, per cwt; under 100#, +$9; 100–399#, +$6; 400–999#, +3.50; 1000–1999#, +1.00; 2000–4999#, base price; 5000–9999#, −10¢; 10,000–19,999#, −30¢; 20,000–29,999#, −50¢; 30,000# and up, −70¢

EXTRAS, per cwt—*Quantity: less than 700#, +50¢; 700–1499#, +25¢; 1500–7999#, +10¢. *Size†: #2 +$2.20; #3 +$1.10; #4 +80¢; #5 +62.5¢; #6, #7 +45¢; #8, #9, #10, #11 +35¢. *Bending: heavy, +80¢; light, +$2 (except in New York City and surrounding metropolitan area where bending must be done on the job). *Engineering (details and placing from designs by others): over 500 tons, +45¢; 200–500 tons, +50¢ but not over $4500; 20–200 tons, +60¢ but not over $2000; 5–20 tons, +70¢ but not over $240; under 5 tons, +85¢ but not over $70. *Design only: +60¢.

WELDED FABRIC REINFORCING Per 100 sq ft., carload lots fob mill

4 × 16 in., No. 5 & 10 wires—
Joliet, Ill., Donora, Pa., Monessen, Pa. $3.66

4 × 12 in., No. 6 & 12 wires—
Joliet, Ill., Donora, Pa., Monessen, Pa. $2.43

6 × 6 in., No. 6 & 6 wires—
Joliet, Ill., Donora, Pa., Monessen, Pa. $3.84

*‡ Delivered *a 2000–9999# *b 10,000–15,999#, fob city *c 20 tons or over *d 10,000–19,999# *e Intermediate struct'l *f incl. delivering in free zone *g CL *h list price; dominion tax exempt; add provincial and municipal taxes *i add dominion, provincial and municipal sales taxes *j Intermediate and hard grade *k fob city *l delivered; contractor to do unloading *m copper alloy *n LCL *o asphalt coated *p del. of 500 sq. yd. or more. *q 3 lb *r 2% off for cash *s 2,000–4,999# *t add 15¢ del. *u add 6.25¢ switch *v incl 15¢ del. *x add 5¢ switch *y add 30¢ del. *z add 10¢ del. *A American made. *C Canadian made. ** Aver. of Canadian & American.

PLUMBING, HEATING, WATER, SEWER AND DRAIN PIPE

	C. I. PIPE PRICE INDEXa	ASBESTOS CEMENT PIPE per lin. ft. f.o.b. city 8" Pr Cl. 150	ASBESTOS CEMENT PIPE 12" Sew Cl. I	VITRIFIED SEWER PIPE Per foot, Delivered ASTM C13-44T std. 8 in. s.s.	VITRIFIED SEWER PIPE std. 12 in. s.s.	VITRIFIED SEWER PIPE 24 in. ds.	VITRIFIED SEWER PIPE 36 in. ds.	CLAY DRAIN TILE ASTM C4-24 PER 1,000 ft., carload lots, f.o.b. 6 in.	CLAY DRAIN TILE 8 in.	CONCRETE SEWER PIPE Per ft., delivered: ASTMC 14-41 12 in.	CONCRETE SEWER PIPE 24 in.
Atlanta	123.5	$1.64	$2.68	$ .55	$1.30	$4.95	$12.25	$225.00		$0.88m	$3.25m
Baltimore	132.9	1.64	2.46	.665	1.28	5.08v	12.71	187.80	$289.20	1.01	2.75m
Birmingham	119.0	1.64	2.68	.44	.81	3.55w	10.37w	260.00‡	440.00‡	1.90m	4.00
Boston	135.6	1.66	2.46	.788qrt	1.502qrt	6.211qrt		203.40r	312.60r	1.60mg	3.80mg
Chicago	133.4	1.64	2.46	.93m	1.78m	7.52m	21.16m	220.00n	330.00n	1.30	4.00
Cincinnati	128.2	1.66	2.55	.665t	1.2825t	4.905t	12.505	240.00	370.00	.85m	3.25m
Cleveland	134.2	1.66	2.55	.567s	1.0935s	4.545t	11.787t	149.40m	231.60m	.85m	3.50m
Dallas	130.5	1.66	2.80	.439	.799	4.00b	9.17b	......		.63	1.86
Denver	140.1	1.73	2.80	.47n	.84n	3.73n				.74m	2.50m
Detroit	134.5	1.66	2.55	.85	1.60	6.45	17.50	240.00m	370.00m	.95	3.82
Kansas City	131.1	1.66	2.55	.61	1.105	4.54	12.75	260.00	485.00	.90	2.90
Los Angeles	140.2	1.73	2.46	.74l	1.61l	6.42l	15.36l	228.20l	348.90l	1.02	3.02f
Minneapolis	142.0	1.68	2.68	.83mo	1.50mo	6.50mo		......		1.76h	5.74h
Montreal				1.02u	1.80u	6.30u	12.00u			1.17h	3.11j
New Orleans	126.1	1.64	2.68	.51	.925	5.18		350.00p	550.00p	.75	2.50
New York	131.4	1.66	2.46	.99	1.88	7.37	19.06			1.50	3.00
Philadelphia	130.8	1.64	2.46	.65	1.25	4.95e	12.65e	300.00‡	350.00‡	1.60h	3.95h
Pittsburgh	135.3	1.66	2.46	.468m	.864m	3.86m	9.78m	152.00	244.00	1.05h	2.50h
St. Louis	129.6	1.64	2.55	.59	1.08	4.45	10.80	180.00l	380.00l	1.45il	3.10il
San Francisco	140.2	1.73	2.46	.74d	1.62d	6.59d	16.47d	320.00l	530.00l	1.06m	3.30m
Seattle	140.8	1.73	2.46	.66b	1.26b	6.34	17.90	205.00c		1.00k	3.10k
Toronto	..			.76	1.425	6.00		157.00	280.00	.87	3.05

***WROUGHT STEEL PIPE** (Full standard weight) Discount from list; see footnote

Mill	2½ & 3 in.; Butt Weld† Black %	2½ & 3 in.; Butt Weld† Galv. %	3½ to 6 in.; Lap Weld† Black %	3½ to 6 in.; Lap Weld† Galv. %
Lorain, Ohio	23.00	4.75	......	......
Aliquippa, Pa	23.00	9.25	13.50a	+0.75a
Sparrows Pt., Md	21.00	2.75	7.50a	+11.25
Benwood, W. Va	23.00	4.75	13.50d	+0.75d
Youngstown, O	23.00	4.75	......	......
Indiana Harbor, Ind	22.00	3.75	12.50ab	+6.25a
Sharon, Pa	23.00	4.75	......	......
Wheatland, Pa.	23.00	5.75	13.50a	+4.25a
Etna, Pa	23.00	9.25	11.75d	+2.50d
Fontana, Calif	10.50b	+7.75b	1.00ab	+17.75ab

† Threaded and coupled. a 3½ to 4 in. b Continuous weld, 5 and 6 in. d 6 in.

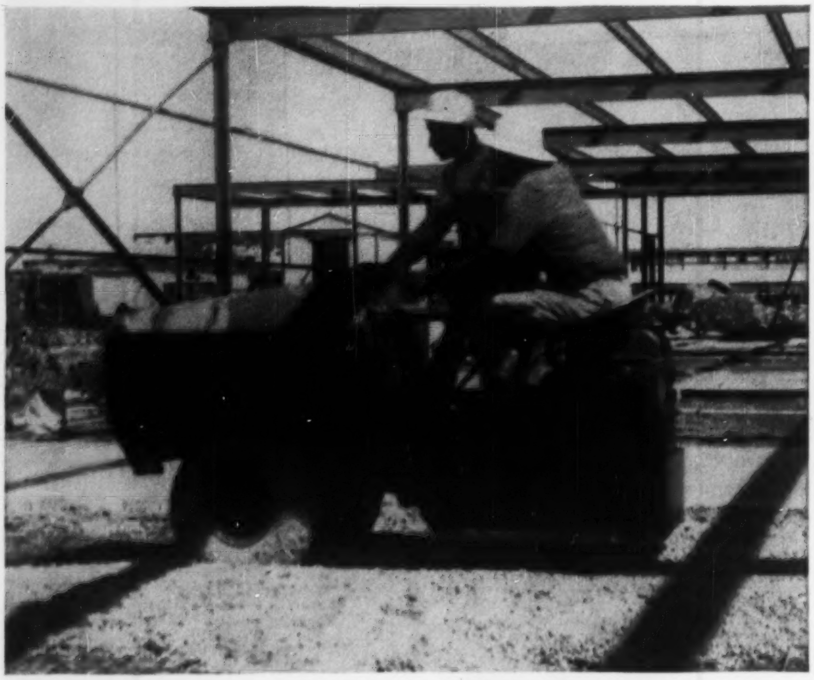
*‡ Delivered. *a PRICE INDEXES for CENTRIFUGAL CAST IRON PIPE (Include carload freight allowed to city). These also serve as the HISTORICAL RECORD of THE $ PER NET TON PRICE of CLASS B, B&S, PIT CAST IRON PIPE. F.O.B. Foundry Price Indexes Birmingham, Ala., 119.0; Burlington, N. J., 127.8. *b Extra strength ASTM C 200-44T *c 4-in., $113 *d SS361-A *e 30-in. *f 21 in. *g culvert pipe; reinforced, ASTM C 76-41 *h reinforced, ASTM C 75-41 *i reinforced, ASTM C 76-37 *j centrispun; no standard specs. in Canada *k 2% off for cash *l fob plant *m truck delivery *n LCL delivered, fob truck *o listed price based on LCL (no min.) *p freight allowed to destination in city *q ASTM C 13-40 *r CL fob origin, freight allowed *s 2 ft lengths *t 3 ft lengths *u CESA A 60-1941 specs. used *v standard strength *w ss; add 20% for d.s.

* **WROUGHT STEEL PIPE:** Deduct discounts shown above from the following standard list consumers carload prices to get mill price. List prices per ft. ("based on approx. $200 per net ton): Butt Weld ⅛ in., 5½¢; ¼ in., 6¢; ⅜ in., 6¢; ½ in., 8½¢; ¾ in., 11½¢; 1 in., 17¢; 1¼ in., 23¢; 1½ in., 27½¢; 2 in., 37¢; 2½ in., 58½¢; 3 in., 76½¢. Lap Weld 3½ in., 92¢; 4 in., $1.09; 5 in., $1.48; 6 in., $1.92. Add freight rates plus 3% transportation tax to get destination price.

WROUGHT IRON PIPE: List prices per ft. same as for wrought steelpipe, but add following "discounts" to get Pittsburgh mill price: Butt Weld—1 in. black, + 65.54, galv., + 95.77; 1¼ in. black, + 65.54, galv. + 95.23, 1½ in. black, + 61.79 galv. + 91.22; Lap Weld—2½ in. to 3 in. black + 67.95 galv. + 95.77; 4½ in. to 6 in. black + 64.74 galv. + 90.68 Add freight rates plus 3% transportation tax to get destination price.

Next Report: See ENR Dec. 13

Continued on page 161



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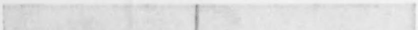
PRIME-MOVER



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CONN.	T. B. Holmes & Sons, Hartford
FLA.	M. D. Moody & Sons, Jacksonville — Tampa Highway Equip. Co., Orlando
GA.	R. S. Armstrong & Bro., Atlanta
IDAHO	The Sawtooth Co., Boise
ILL.	Arrow Cont. Equip., Chicago C. C. Hubbard Co., Decatur
IND.	Stockberger Mcy. Inc., Ft. Wayne Ram Tool Co., Indianapolis
IOWA	Gierke-Robinson Co., Davenport Mainline Equip. Co., Des Moines Pecaut Ind. Supply, Sioux City
KAN.	Vic. L. Phillips Co., Kansas City — Wichita
KY.	Cont. Equip. & Truck, Lexington
LA.	So. States Equip., New Orleans So. Equip. & Tract., Baton R. — Monroe
ME.	Stanley & Cadigan, Portland
MD.	S. M. Christhilf, Baltimore
MASS.	Bldrs. Equip. & Supply, W. Medford
MICH.	Cont. Mcy. Co., Detroit — Gr. Rapids
MINN.	Wm. H. Zeigler Co., Minneapolis
MO.	O. B. Avery Co., St. Louis
MONT.	Ind. Equip. Co., Billings Normont Equip., Gr. Falls Treasure State Equip., Kalispell
NEB.	Fuchs-Clayton Mcy., Omaha
NEV.	Pioneer Equip. Co., Reno
N. H.	Scott Machinery, Concord
N. J.	Contractors Supply, Englewood
N. M.	J. D. Coggins Co., Albuquerque
N. Y.	Contractors Supply, Long Island City Dow & Co., Buffalo — Rochester Vans Equip., Rensselaer Midstate Cont. Equip., Syracuse Vincent S. Jerry Co., Plattsburg
N. C.	A. E. Finley Assoc., Raleigh
N. D.	Midwest Equip. Co., Fargo — Bismarck
OHIO	W. T. Walsh Co., Cleveland Lorenz Equip. Co., Columbus Flack Equip. Co., Toledo Rish Equip. Co., Cinn. — Dayton Bischoff Mcy., Gallipolis
OKLA.	R. A. Young & Sons, Tulsa
ORE.	Loggers & Cont. Mcy., Portland
PA.	Furnival Mcy. Co., Phila. — Harris. Anderson Equip. Co., Pittsburgh
R. I.	Bldrs. Equip. & Supply, Providence
S. C.	Van Lott, Inc., W. Columbia
S. D.	Pecaut Equip. Co., Sioux Falls
TENN.	Tri-State Equip., Memphis Nixon Mcy. Co., Chatt. — Knox. McCarthy-Jones-Woodard, Nashville
TEXAS	F. M. Equip., Dallas — Lubbock J. W. Chumley Co., Houston Border Mcy. Co., El Paso Askew Equip., San Antonio
UTAH	Rocky Mtn. Mcy., Salt Lake City
VT.	Reynolds & Son, Barre
VA.	Rish Equip. Co., Rich. — Roan.
WASH.	Universal Equip. Co., Seattle Anderson Equip. Serv., Spokane
W. VA.	Rish Equip. Co., Charl. — Clark.
WIS.	Hunter Tractor & Mcy., Milw.
CANADA	Gen. Supply, Montreal Gen. Supply, Ottawa, Toronto Howard F. Powell, Winnipeg Western Tractor, Regina — Sask. Purves Ritchie Ltd., Calgary Purves Ritchie Ltd., Vancouver Mar. Newfnd. Agencies, Halifax
ALASKA	Northern Commercial Co., Anchorage — Fairbanks — Juneau — Ketchikan — Nome

Materials Prices November Market Quotations by ENR Field Reporters

IRON AND STEEL PRODUCTS—PER 100 LBS. BASE MILL PRICES

	STRUCT SHAPES	PLATE CARBON STEEL	REINF BARS billet	RIVETS ½-in. structural	SHEET PILING Base	STEEL RAILS Per Net Ton Standard	STEEL RAILS Per Net Ton Light	TRACK SUPPLIES Angle Bars	TRACK SUPPLIES Std Spikes	TRACK SUPPLIES Tie Plates	TRACK SUPPLIES Track Bolts
Birmingham Area	$5.00	$4.85	$5.075	$10.85	......	$101.50	$120.00	$6.35	$8.775	$6.025	......
Chicago Area	5.00	4.85	5.075	10.85	$5.90	101.50	120.00	6.35	8.775	6.025	......
Pittsburgh Area	5.00	4.85	5.075	10.85	5.90	101.50	120.00	6.35	8.775	6.025	$13.10
Buffalo Area	5.00	4.85	5.075	10.85	5.90	101.50	120.00	6.35	8.775	6.025	13.10
Cleveland	......	......	5.075	10.85	5.90	......	......	......	......	......	13.10
Youngstown Area	......	......	5.075	......	......	......	......	......	8.775	......	......
Geneva	5.00	4.85	5.175	......	......	......	......	......	......	......	......
Los Angeles	5.70	......	5.775	......	5.90	......	......	......	8.775	......	......
Pueblo	......	......	......	......	......	......	......	6.35	8.775	6.025	......

IRON AND STEEL PRODUCTS—F.O.B. WAREHOUSE, PER 100 LBS., BASE PRICE

	STRUCTURAL SHAPES Per 100 lb. base price	REINFORCING BARS Per 100 lb., base price 5 tons to carload lot New billet	REINFORCING BARS Rail steel	EXPANDED METAL LATHk Per 100 sq. yd., carload lots Std. diamond mesh, 3.4 lb.	EXPANDED METAL LATHk Std. ribbed 3.4 lb.
Atlanta	$11.50	....	$8.90c	$49.50	$54.00
Baltimore	8.67	8.10j		42.00	46.50
Birmingham	8.05t	7.91t	7.91t	65.00p	71.00p
Boston	8.90a	8.47	8.47	50.90	55.85
Chicago	8.05	6.81gu	6.81gu	49.00‡	60.00‡
Cincinnati	8.70ak	7.69rs	....	45.00mn	49.50mn
Cleveland	8.38	6.79e	....	43.50‡	48.00‡
Dallas	9.45	8.25	8.25	49.00	52.00
Denver	9.60	8.45e	....	57.00n	63.00n
Detroit	8.55	8.13	....	56.00	63.00
Kansas City	8.87a	8.73	....	49.00	60.00
Los Angeles	8.70fd	7.35	....	57.50	63.50
Minneapolis	8.45d	8.76b	8.76b	45.00s	49.50s
Montreal	8-8.75iC/8.05-8.45A	7.75/8.95i	7.75/8.95	66.70h	70.20h
New Orleans	....	7.65aks	....	45.50	50.00
New York	8.71	7.93y	7.93y	47.50mo	54.50mo
Philadelphia	8.04	7.14	....	42.50‡	47.00‡
Pittsburgh	7.43	6.57**	....	42.50	47.00
St. Louis	8.48s	7.90c	7.90c	59.50l	61.50l
San Francisco	8.95	8.90j	....	47.50	53.00
Seattle	9.15	8.35s	....	62.00nr	68.00nr
Toronto	8.45s	7.60	7.60	56.00nq	59.00nq

Quantity extras, per cwt: under 100#, +$9; 100-399#, +$6; 400-999#, +3.50; 1000-1999#, +1.00; 2000-4999#, base price; 5000-9999#, −10¢; 10,000-19,999#, −30¢; 20,000-29,999#, −50¢; 30,000# and up, −70¢

EXTRAS, per cwt—*Quantity: less than 700#, +50¢; 700-1499#, +25¢; 1500-7999#, +10¢. *Size†: #2 +$2.20; #3 +$1.10; #4 +80¢; #5 +62.5¢; #6, #7 +45¢; #8, #9, #10, #11 +35¢. *Bending: heavy, +80¢; light, +$2 (except in New York City and surrounding metropolitan area where bending must be done on the job). *Engineering (details and placing from designs by others): over 500 tons, +45¢; 200-500 tons, +50¢ but not over $4500; 20-200 tons, +60¢ but not over $2000; 5-20 tons, +70¢ but not over $240; under 5 tons, +85¢ but not over $70. *Design only: +60¢.

WELDED FABRIC REINFORCING
Per 100 sq ft., carload lots
fob mill

4 × 16 in., No. 8 & 10 wires—
Joliet, Ill., Donora, Pa., Monessen, Pa. $3.66

4 × 12 in., No. 8 & 12 wires—
Joliet, Ill., Donora, Pa., Monessen, Pa. $2.43

6 × 6 in., No. 6 & 6 wires—
Joliet, Ill., Donora, Pa., Monessen, Pa. $3.84

*‡ Delivered *a 2000-9999# *b 10,000-15,999#, fob city *c 20 tons or over *d 10,000-19,999# *e intermediate struct'l *f incl. delivering in free zone *g CL *h list price; dominion tax exempt; add provincial and municipal taxes *i add dominion, provincial and municipal sales taxes *j intermediate and hard grade *k fob city *l delivered; contractor to do unloading *m copper alloy *n LCL *o asphalt coated *p del. of 500 sq. yd. or more. *q 3 lb *r 2% off for cash *s 2,000-4,999# *t add 15¢ del. *u add 6.25¢ switch *v incl 15¢ del. *x add 5¢ switch *y add 30¢ del. *z add 10¢ del. *A American made. *C Canadian made. ** Aver. of Canadian & American.

PLUMBING, HEATING, WATER, SEWER AND DRAIN PIPE

	C. I. PIPE PRICE INDEXa	ASBESTOS CEMENT PIPE per lin. ft. f.o.b. city 6" Pr Cl. 150	ASBESTOS CEMENT PIPE 12" Sew Cl. I	VITRIFIED SEWER PIPE Per foot, Delivered ASTM C13-44T std. 8 in. s.s.	VITRIFIED SEWER PIPE std. 12 in. s.s.	VITRIFIED SEWER PIPE 24 in. ds.	VITRIFIED SEWER PIPE 36 in. ds.	CLAY DRAIN TILE ASTM C4-24 PER 1,000 ft., carload lots, f.o.b. 6 in.	CLAY DRAIN TILE 8 in.	CONCRETE SEWER PIPE Per ft., delivered: ASTMC 14-41 12 in.	CONCRETE SEWER PIPE 24 in.
Atlanta	123.5	$1.64	$2.68	$.55	$1.30	$4.95	$12.25	$225.00	......	$0.88m	$3.25m
Baltimore	132.9	1.64	2.46	665	1.28	5.08v	12.71	187.80	$289.20	1.01	2.75m
Birmingham	119.0	1.64	2.68	44	81	3.55w	10.37w	260.00‡	440.00‡	1.90m	4.00
Boston	135.6	1.66	2.46	788qrt	1.502qrt	6.211qrt		203.40r	312.60r	1.60mg	3.80mg
Chicago	133.4	1.64	2.46	93m	1.78m	7.52m	21.16m	220.00n	330.00n	1.30	4.00
Cincinnati	128.2	1.66	2.55	665t	1.2825t	4.905t	12.505	240.00	370.00	85m	3.25m
Cleveland	134.2	1.66	2.55	567s	1.0935s	4.545t	11.787t	149.40m	231.60m	85m	3.50m
Dallas	130.5	1.66	2.80	439	799	4.00b	9.17b	......	......	63	1.86
Denver	140.1	1.73	2.80	47n	84n	3.73n		......	......	74m	2.50m
Detroit	134.5	1.66	2.55	85	1.60	6.45	17.50	240.00m	370.00m	95	3.82
Kansas City	131.1	1.66	2.55	61	1.105	4.54	12.75	260.00	485.00	90	2.90
Los Angeles	140.2	1.73	2.46	74l	1.61l	6.42l	15.36l	228.20l	348.90l	1.02	3.02f
Minneapolis	142.0	1.68	2.68	83mo	1.50mo	6.50mo		......	......	1.76h	5.74h
Montreal				1.02u	1.80u	6.30u	12.00u	......	......	1.17h	3.11j
New Orleans	126.1	1.64	2.68	51	925	5.18	....	350.00p	550.00p	75	2.50
New York	131.4	1.66	2.46	99	1.88	7.37	19.06	......	......	1.50	3.00
Philadelphia	130.8	1.64	2.46	65	1.25	4.95v	12.65v	300.00‡	350.00‡	1.60h	3.95h
Pittsburgh	135.3	1.66	2.46	468m	864m	3.86m	9.78m	152.00	244.00	1.05h	2.50h
St. Louis	129.6	1.64	2.55	59	1.08	4.45	10.80	180.00l	380.00l	1.45ul	3.10ul
San Francisco	140.2	1.73	2.46	74d	1.62d	6.59d	16.47d	320.00l	530.00l	1.06m	3.30m
Seattle	140.8	1.73	2.46	66b	1.26b	6.34	17.90	205.00k		1.00k	3.10k
Toronto	......	....	....	76	1.425	6.00	......	157.00	280.00	87	3.05

*WROUGHT STEEL PIPE
(Full standard weight)
Discount from list; see footnote

Mill	2½ & 3 in.; Butt Weld† Black %	2½ & 3 in.; Butt Weld† Galv. %	3½ to 6 in.; Lap Weld† Black %	3½ to 6 in.; Lap Weld† Galv. %
Lorain, Ohio	23.00	4.75		
Aliquippa, Pa	23.00	9.25	13.50a	+0.75a
Sparrows Pt., Md	21.00	2.75	7.50a	+11.25
Benwood, W. Va	23.00	4.75	13.50d	+0.75d
Youngstown, O	23.00	4.75		
Indiana Harbor, Ind	22.00	3.75	12.50ab	+6.25a
Sharon, Pa	23.00	4.75		
Wheatland, Pa	23.00	5.75	13.50a	+4.25a
Etna, Pa	23.00	9.25	11.75d	+2.50d
Fontana, Calif	10.50b	+7.75b	1.00ab	+17.75ab

† Threaded and coupled. a 3½ to 4 in. b Continuous weld. 5 and 6 in. d 6 in.

*‡ Delivered. *a PRICE INDEXES for CENTRIFUGAL CAST IRON PIPE (Include carload freight allowed to city). These also serve as the HISTORICAL RECORD of THE $ PER NET TON PRICE of CLASS B, B&S, PIT CAST IRON PIPE. F.O.B. Foundry Price Indexes Birmingham, Ala., 119.0; Burlington, N. J., 127.8. *b Extra strength ASTM C 200-44T *c 4-in., $113 *d SS361-A *e 30-in. *f 21 in. *g culvert pipe; reinforced, ASTM C 76-41 *h reinforced, ASTM C 75-41 *i reinforced, ASTM C 76-37 *j centrispun; no standard specs. in Canada *k 2% off for cash *l fob plant *m truck delivery *n LCL delivered, fob truck *o listed price based on LCL (no min.) *p freight allowed to destination in city *q ASTM C 13-40 *r CL fob origin, freight allowed *s 2 ft lengths *t 3 ft lengths *u CESA A 60-1941 specs. used *v standard strength *w ss; add 20% for d.s.

* WROUGHT STEEL PIPE: Deduct discounts shown above from the following standard list consumers carload prices to get mill price. List prices per ft. (*based on approx. $200 per net ton): Butt Weld ⅛ in., 5½¢; ¼ in., 6¢; ⅜ in., 6¢; ½ in., 8½¢; ¾ in., 11½¢; 1 in., 17¢; 1¼ in., 23¢; 1½ in., 27½¢; 2 in., 37¢; 2½ in., 58½¢; 3 in., 76½¢. Lap Weld 3½ in., 92¢; 4 in., $1.09; 5 in., $1.48; 6 in., $1.92. Add freight rates plus 3% transportation tax to get destination price.

WROUGHT IRON PIPE: List prices per ft. same as for wrought steelpipe, but add following "discounts" to get Pittsburgh mill price: Butt Weld—1 in. black, + 65.54, galv., + 95.77; 1¼ in. black, + 65.54, galv. + 95.23, 1½ in. black, + 61.79 galv. + 91.22; Lap Weld—2½ in. to 3 in. black + 67.95 galv. + 95.77; 4½ in. to 6 in. black + 64.74 galv. + 90.68 Add freight rates plus 3% transportation tax to get destination price.

Next Report: See ENR Dec. 13

Continued on page 161

MEET OUR HARD-WORKING AMBASSADOR

HENDRIX *Dragline Buckets*

...in use throughout the world

See you at the ROAD SHOW — CHICAGO
Jan. 28-Feb. 2, 1957

A TYPE FOR EVERY DIGGING PURPOSE
¼ to 40 Cubic Yards

All Hendrix Buckets available without perforations

HENDRIX MANUFACTURING COMPANY, Inc.
MANSFIELD, LOUISIANA

Hendrix *Lightweight* DRAGLINE BUCKETS

Materials Prices November Market Quotations by ENR Field Reporters

LUMBER, TIMBER, PLYWOOD—PER M FT., B.M., CARLOAD LOTS F.O.B.

SOUTHERN PINE AND DOUGLAS FIR

All Southern Pine is No. 2 common or better and for No. 1 N. C. Box. (Prices in Bold Face)

All Fir boards, dimensions, planks No. 2, Fir small timbers and timbers are No. 1. Lengths up to 20 ft. (Prices in italics)

		1x6 s4s	1x8 s4s	2x4 s4s	2x6 s4s	2x8 s4s	2x10 s4s	3x12 Rgh	6x12 Rgh	12x12 Rgh	LONG LEAF Y. P. Merchantable grade up to 20 ft. 2x12 Rgh	LONG LEAF Y. P. 12x12 Rgh	PLYWOOD Rail freight increment (See note for base price) 5/8"	PLYWOOD 3/4"
Atlanta	†	$83.00	$88.00	$77.50	$76.00	$79.50	$83.00	$81.00	......	......			$22.32	$27.24
Baltimore	*	92.00	96.00	96.00	98.00	98.00	102.00	114.00	......	......	$170.00	$185.00	25.92	31.60
		105.00g	*105.00g*	*123.00g*	*123.00g*	*123.00g*	*123.00g*	*133.00g*	*$144.00*	*$144.00*				
Birmingham	†	86.00	88.00	81.00	88.00	91.00	96.00	111.00			118.00	160.00	21.78	26.58
		107.00	*107.00*	*103.50*	*106.50*	*106.50*	*111.50*	*110.00*	*107.00*	*107.00*				
Boston	1	102.00f	102.00f	107.00f	107.00f	107.00f	118.00a						25.92	31.60
		98.00n	*98.00n*	*116.00*	*116.00*	*116.00*	*123.00*	*126.00*	*136.00*	*141/143*				
Chicago	**	96.00	99.00	93.00	107.00	115.00	116.00	111.00			139.00	139.00	22.45	27.37
		106.00	*106.00*	*119.00*	*117.00*	*117.00*	*118.00*	*126.00*	*126.00*	*126.00*				
Cincinnati	*	101.25	102.50	90.00	98.25	103.00	111.50	119.50			141.75	141.75	25.00	30.48
		102.00	*103.00*	*107.75*	*113.25*	*114.75*	*116.00*	*138.00*	*138.00*	*138.00*				
Cleveland	**	93.00	94.00	99.00	97.00	97.00	97.00						25.37	30.93
				113.00	*110.00*	*110.00*	*110.00*	*136.00*	*136.00*	*128.00*				
Dallas	k‡	75.00	82.00	75.00	75.00	72.00	72.00	130.00			130.00	140.00	18.72	22.80
Denver	*	*Not in stock*		*135.00*	*135.00*	*135.00*	*140.00*	*156.00*	*160.00*	*16[illegible].00*			13.92	16.98
Detroit	‡	115.00	118.00	114.00	115.00	118.00	122.00				130.00		25.00	30.48
		125.00	*125.00*	*130.00*	*130.00*	*130.00*	*135.00*	*185.00*	*195.00*	*195.00*				
Kansas City	*	125.00	125.00	120.00	125.00	135.00	135.00						16.56	20.16
		125.00	*125.00*	*125.00*	*125.00*	*130.00*	*135.00*	*165.00*	*185.00*	*210.00*				
Los Angeles	1	*95.00*	*95.00*	*95.00*	*95.00*	*95.00*	*95.00*	*120.00*	*130.00*	*120.00*			16.61ab	20.25ab
Minneapolis	#	*140.00*	*140.00*	*145.00*	*145.00*	*145.00*	*145.00*	*185.00*	*185.00*	*185.00*			19.89	24.25
Montreal	ab	92.00	102.00	92.00	92.00	110.00	128.00				123.00	123.00		
		180.00	*180.00*	*180.00*	*180.00*	*180.00*	*180.00*	*170.00*	*170.00*	*170.00*				
New Orleans	†	92.00	92.00	97.00	97.00	96.00	100.00	124.50			156.00	154.00	18.72	22.80
	†	*108.50*	*108.50*	*105.00*	*118.50*	*118.50*	*118.50*	*131.00*	*131.00*	*151.00*				
New York	1	112.00	115.00	120.00	125.00	125.00	125.00	165.00			240/265	240/265	25.93	31.60
		......	......	*120.00*	*122.50*	*124.00*	*124.00*	*169/180*	*169/180*	*169/180*				
Philadelphia	‡		Range from $117.00 to $137.00				117/137	117/137			214/224	214/224	25.92	31.60
			Range from $131.00 to $163.00				*131/163*	*136/158*	*165.00*	*165.00*				
Pittsburgh	2	130.00	140.00	130.00	155.00	140.00	145.00				155.00		25.92	31.60
		130.00	*140.00*	*130.00*	*155.00*	*140.00*	*145.00*		*200.00*	*200.00*				
St. Louis	#	113.00	115.00	123.00d	125.00d	125.00e	131.00e						18.72	22.80
				131.00	*133.00e*	*133.00e*	*139.00e*	*189.00e*	*189.00*	*189.00*				
San Francisco	A	*83.00*	*83.00*	*85.00*	*85.00*	*85.00*	*85.00*	*120.00*	*130.00*	*140.00*			12.22	14.91a
Seattle	†	*82.00*	*75.00*	*74.00*	*76.00*	*76.00*	*80.00*	*95.00*	*95.00*	*95.00*				
Toronto	a	100.00	103.00	98.00	98.00	100.00	100.00	117.00			100.00			
		114.00	*117.00*	*128.00*	*130.00*	*130.00*	*140.00*	*160.00*	*145.00*	*150.00*				

† F.o.b. mill. * F.o.b. city, CL, out of yard. ** F.o.b. city, CL, direct mill shipment. ‡ Deliv. to contr. CL. 1. Retail, LCL, at yard. # Retail, LCL, deliv. 2. Deliv. truck lots. 3. asd., truckload lots, 5/6 Mftbm

LUMBER: Bold Face Type, Southern Pine. Italics, Douglas Fir. *a Spruce. *b Tax exempt. *c 5M lots. *d 8, 10, & 12 ft. lengths. *e 8 to 16 ft. lengths. *f Hemlock *g No. 1 common. *j 8ft. lengths. *k No. 3 common. *n #3. A incl rail rate from North west mills to San Francisco are $11.50 to $15.00 per M ft. bm. From Northern Calif. mills $9.00 by rail, $9.50 by truck. All rates for surfaced stock. For rough, add $3.00 to above figures.

PLYWOOD: Interior Fir Plywood, 4' by 8' panels, 5-ply, sanded 2 sides, water resistant glue, carload lots, delivered per 1,000 sq. ft. surface. Seattle base price on 5/8", $143.00; on 3/4", $156.00. Exterior 5/8", $148.00, 3/4", $164.00. For other centers add rail freight increment from table on proper size. Oiling and edge sealing charges included. *a Lower rate by water shipment. *b 50,000 lb. minimum.

GLASS, EXPLOSIVES, CHEMICALS

	WINDOW GLASS Discounts from jobbers list, Feb. 1, 1950a Single or Double Strength A quality	WINDOW GLASS B quality	EXPLOSIVES Per lb. 40% Ammonia Gelatin in 50 lb. cases delivered in 200 lb. lots*
Atlanta	77%c	78%e	$0.2540
Baltimore	74%d	76%d	.2540
Birmingham	82%	83%	.1990
Boston	72-10%	72-10%	.2540
Chicago	72%	72%	.2540
Cincinnati	74%	74%	.2540
Cleveland	74-2-10%	74-2-10%	.2940
Dallas	75%	75%	.2615
Denver	73%	73%	.2590
Detroit	74-10-10%	74-10-10%	.2540
Kansas City	76-10%	76-10%	.2590
Los Angeles	70%	76%	.2565
Minneapolis	71-10%	71-10%	.2590
Montreal	40-10-5%bc	40-10-5%b	22.05h
New Orleans	76%	78%	.2590
New York	79%	79%	.4425g
Philadelphia	74%	76%	.2540
Pittsburgh	73%	73%	.2540
St. Louis	76-10%	76-10%	.2590
San Francisco	60%	68%	.2510
Seattle	67%	70%	.2565

Price of 60% Ammonia Gelatin is $0.15 per lb. higher than 40% in U. S., $1.75 per 100 lbs. higher in Canada.

Glass: *a Jobbers' list price per box, 14 x 20, ss, $42.75 for A quality, $37.50 for B quality; 14 x 20, ds, $60.00 for A quality, $52.75 for B quality. *b Discount from list, Apr. 1951; sales tax included, but 8% tax exemption not allowable for. *c 77% for single strength *d Discount 6/15/52. *e 77% for double strength

Explosives: * Cartridges of 1¼", 1½", 1¾", 2", 2¼", 2½", 3" diameters. Urban prices influenced by service charges or local storage and delivery regulations do not consistently reflect quantity prices in less congested areas. *g In borough of Kings, Queens, and Richmond and in Manhattan south of Canal St., add delivery charge of $20.00 per trip. *h F.o.b Beloeil (near Montreal), per 100 lb. forcite, 40%. Forcite 60%, $23.80

40% Ammonia Gelatin price ranges in other than urban areas, per lb. (except Seismograph Grades)

	C/L 20,000 lb. net	Tons	200 lb. lots
E. of the Miss., except Fla. and Me.	$0.1915	$0.2265	$0.2465
W. of Miss. to Rocky Mtn. States, Fla. and Maine	.1965	.2315	.2515
Rocky Mtn. States	.1965	.2315	.2515
Pacific N. W. States	.1940	.2290	.2490
Pacific S. W. States	.1915	.2265	.2465

• Next Report: See ENR Dec. 20

PILES, TIES F. O. B.

PILES

Prices per linear foot, fir and pine, bark off, f.o.b. cars, New York. Fir based on Wash. and Ore. points to New York shipping area; pine based on freight from Norfolk.

Dimensions	Points	Length	By Rail Pine*	By Rail Fir
12-in. at butt	6-in.	30 to 50-ft.	$0.51	....
12-in.—2-ft. from butt	6-in.	50 to 59-ft.	.54	....
12-in.—2-ft. from butt	6-in.	60 to 69-ft.	.58	....
12-in.—2-ft. from butt	6-in.	90 to 100-ft.	....	....
13-in.—3-ft. from butt	5-in.	91 to 100-ft.	....	....
14-in.—2-ft. from butt	6-in.	50 to 69-ft.	.50/.68	....
14-in.—2-ft. from butt	6-in.	70 to 79-ft.	.78/.88	.93
14-in.—2-ft. from butt	5-in.	80 to 85-ft.	.83/.93	.94
14-in.—2-ft. from butt	5-in.	85 to 89-ft.	....	1.00
14-in.—2-ft. from butt	5-in.	90 to 100-ft.	....	1.02

* Pine piling over 80-ft. available only in limited quantities

RAILWAY TIES

Prices f.o.b. per tie for carload lots:

		6" x 8" x 8' Untr.	6" x 8" x 8' Tr.	7" x 8" x 8'6" Untr.	7" x 8" x 8'6" Tr.
Birmingham*	Hardwood, Grade 3	$1.70	$2.55	Gr. 5 $2.25	$3.33
	Grade 2	1.50	2.35	" 4 2.10	3.18
	Grade 1	1.15	2.00	" 3a 1.70	2.78
Chicago	Red Oak		4.00a		4.60a
New York	S. L. Sap Pine	2.00d	4.00d	3.00g	6.00g
	Mixed Oak	2.50d	4.50d	3.50g	6.50g
Philadelphia	Red Oak	2.95/3.15	4.50/4.70	3.60/3.80	5.50/5.75
St. Louis	White Oak	2.75		3.00	
	Red Oak	2.65	3.20a	2.80	3.50a
	Sap Pine or Cypress		3.10a		3.45a
San Francisco	Douglas Fir	2.13ef	3.09ef	2.88bef	4.63caf

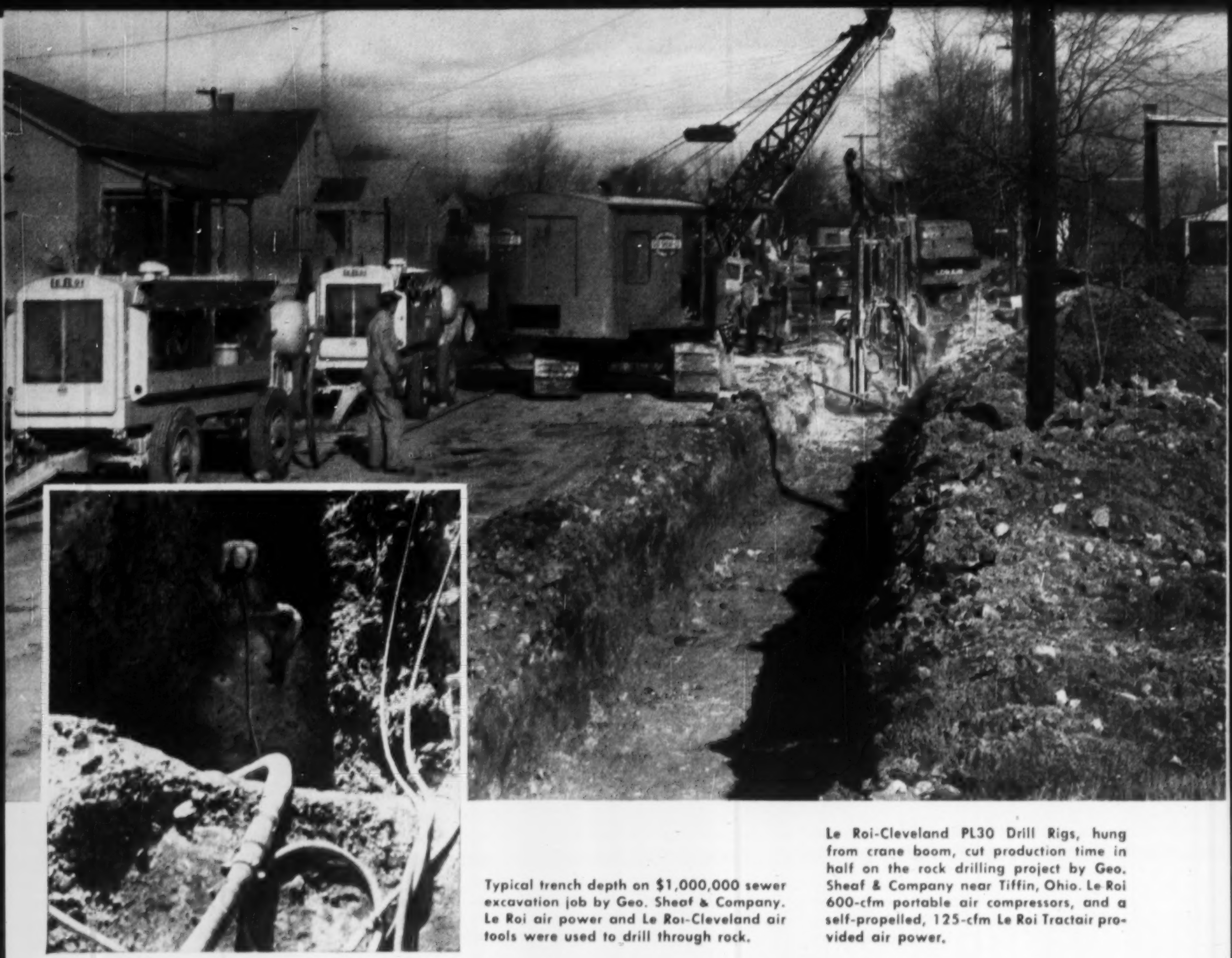
Tr.—Treated; Untr.—Untreated. *a* Creosoted. *b* 7" x 9" x 8'. *c* Empty cel *d* 6 x 8 x 8'6" *e* Green. *f* f.o.b. cars. *g* 7 x 9 x 8'6" * Add 75¢/tie freight charge to Birmingham.

CHEMICALS

Water, sewage treatment, road work, f.o.b. carlots, New York

Bleaching powder in drums f.o.b. works, per 100 lb.	$5.02
Chlorine cylinders, liquid, per lb. f.o.b. works	103
Calcium chloride, 77-80%, flaked, 100-lb. paper bag, f.o.b. works, ton	29.00
Silicate of soda, 52 deg., in drums, f.o.b. works, per 100 lb.	2.30
Soda ash, 58%, in paper bags, per 100 lb. dense	1.70
Sulphate of aluminum, commercial, in 100-lb. bags f.o.b. works	1.85
Sulphate of copper, in bags, 99% per 100 lb. f.o.b. works	14.90

Continued on page 163



Typical trench depth on $1,000,000 sewer excavation job by Geo. Sheaf & Company. Le Roi air power and Le Roi-Cleveland air tools were used to drill through rock.

Le Roi-Cleveland PL30 Drill Rigs, hung from crane boom, cut production time in half on the rock drilling project by Geo. Sheaf & Company near Tiffin, Ohio. Le Roi 600-cfm portable air compressors, and a self-propelled, 125-cfm Le Roi Tractair provided air power.

Rock-Drill Rig on Sewer Job Speeds Production 50%

Contractor uses Le Roi-Cleveland Air Tools to shoot and pull rock, often 18 feet deep, with one drilling.

The right air tools made quite a difference on a $1,000,000 sewer excavation near Tiffin, Ohio. Joseph Parker, General Superintendent of Geo. Sheaf & Company, Columbus, Ohio, states, "In nearly seven months of service in hard limestone, our Le Roi compressors and Le Roi-Cleveland Rock Drills had no down time, while in continuous operation 8 to 16 hours per day. They have performed to our utmost satisfaction. By using Le Roi-Cleveland PL30 Drill Rigs, we lowered our drilling costs and speeded production by 50 per cent."

Flexibility of special drill rig was a major factor in job speed-up. The Le Roi-Cleveland PL30 Drill Rigs provided unusual flexibility and ease of operation. This specially-designed rig, developed for rock work on pipeline projects, allowed the contractor to obtain proper drilling patterns for safe blasting in residential areas. Thus he cut construction time in half because he could shoot and pull the rock with only one drilling.

The Contractor standardized on Le Roi-Cleveland Air Tools using two PL30 Drill Rigs, two Model 52 Breakers, and two H10B Sinker Drills, plus hose, drill steel, and rock drill bits.

Le Roi air power helped speed up this project. Two Le Roi 600-cfm portable air compressors, and one self-propelled Le Roi Tractair (a combination 42-hp. wheel tractor and 125-cfm air compressor) were used.

This combination of Le Roi air power and Le Roi-Cleveland air tools gave the contractor exceptional drilling economies, including manpower savings, less upkeep, and more footage per shift.

LE ROI Division of Westinghouse Air Brake Co., Milwaukee 1, Wisconsin, manufacturers of Cleveland air tools, Tractair, portable and stationary air compressors, and heavy-duty industrial engines. Write us for information on any of these products.

Materials Prices November Market Quotations by ENR Field Reporters

STRUCTURAL CLAY BUILDING TILE, BRICK AND LIME—DELIVERED

	STRUCTURAL CLAY TILE PARTITION — SCORED Per M. lots of 2,000 pieces or over, 3x12x12 in.	4x12x12 in.	8x12x12 in.	STRUCTURAL CLAY TILE — LOAD BEARING — SCORED Per M. lots of 2,000 pieces or over, 8x12x12 in.	10x12x12 in.	12x12x12 in.	BRICK Per M. in quantity Common backing	Straight hard	LIME Per ton, in paper, Carload lot, Hydrated finishing	Common hydrated	Pulverized or lump
Atlanta	$148.25p	$148.25p	$296.50p	$333.55p	......	......	$30.50p	$32.70p	$23.50	$24.50	$.....
Baltimore	203.00	217.00	406.00	485.50	596.00	681.00	36.00k	41.00k	33.00	22.00	
Birmingham	135.00p	152.00p		303.00p	376.00p	465.00p	27.00ff	38.00gg	33.35	22.30	26.33
Boston	210.60†	224.60†	421.10†	467.80†	......	......	40.00p	44.00p	35.70†	30.00†	.....
Chicago	135.00	145.00	280.00	......	......	......	30.00	32.00	36.00	29.00	.....
Cincinnati	205.00j	225.00j	296.00jdd	213.00j	288.00j	314.00j	45.00j	46.00j	28.50j	24.25j	28.50j
Cleveland	202.50••	215.00••	......	......	......	......	40.00	42.00	31.00	26.00	.....
Dallas	......	152.00	......	......	......	......	25.75	45.00	32.00	31.00	.....
Denver	......	......	......	......	......	......	36.00	47.50	34.80bb	28.00bb	34.00bb
Detroit	213.00	226.00	425.00	......	620.00	710.00	44.50cc	44.00cc	36.00	32.00	.....
Kansas City	127.50	147.50	270.00	270.00	340.00	400.00	33.00	33.00	32.00	27.50	28.50
Los Angeles	r	r	r	r	r	r	30.50§		34.00	34.00	35.00
Minneapolis	188.00p	210.00p	429.00p	210.00pw	......	......	43.00•p	52.50ii	44.50bbe	35.50bbe	47.50bbde
Montreal	170.00aq	178.00au	325.00au	270.00	400.00	......	42.00	49.00	39.00	22.00	13.75u
New Orleans	186.00	186.00	380.00	380.00	......	......	40.00	55.00	44.00	32.00	32.00
New York	158.10h	168.60h	231.70eh	255.20hn	......	......	44.00		37.00	35.00	..
Philadelphia	156.30	166.80	312.70	375.20	......	......	30/34	34/40	27.60	25.60	3.17
Pittsburgh	154.00	162.00	292.00	340.00	420.00	495.00	36.00	46.00y	32.00	29.50	2.97m
St. Louis	178.50cc	203.00cc	358.00cc	500.00cc	......	......	43.00sl	41.50s	1.00aaa	80aaa	1.30ee
San Francisco	156.85a•	177.10a•	235.30dda•	......	......	......	42.50•	42.50•	27.75	27.75	30.50
Seattle	225.00cc	250.00cc	450.00cc	250.00ccw	......	......	43.00s	55.00s	48.90shh	38.25hh	3.90mhh
Toronto	138.70	148.90	273.75	222.00f	......	......	38.00	63.00	40.00	33.50	31.00

•† F.o.b. yard Roxbury. •a Smooth. •b Per 50 lb. bags. •c 6 x 12 x 12 in.-3 cell. •d Pulverized hot. •e 5%, 10th following month. •f 8 x 8 x 12. •g 5½ x 8 x 12. •h F.o.b. trucks, job site N.Y.C. •j Truck load or over. •k $1.00 discount. •l Red face. •m Per bbl., 180 lb. •n 7¾ x 7¾ x 12. Speed tile. •p Truck lots. •q Provincial and Municipal tax extra. •r Not used because of earthquake danger. •s 2% discount for cash. •t 5½ x 8 x 11¼. •u Tax exempt. •v Sand lime. •w 5 x 8 x 12. •y Stacked. •z Pebble lime price per 80 lb. sack. •aa Price per sack. Lime not sold per ton. •bb LCL. •cc Truck delivery. •dd 6 x 12 x 12. •ee Pebble lime. •ff 80% common. •gg Rough. $40.00 Smooth. •hh lcl. •ii Chi common § F.o.b. yard •** Warehouse delivery. •* F.o.b. plant Stockton.

PAINT, ROOFING—F.O.B. CARLOAD LOTS

	RED LEAD Per 100 lb. in 600-lb. (Approx.) bbl. Dry a	WHITE LEAD Per 100 lb. in 100 lb. cases in oil w	READY-MIXED PAINT Per gal., drums Graphite b	Aluminum c	Ferric Oxide d	ROOFING SUPPLIES; Carload lots f.o.b. factory Rolls, slate surfaced, 85-90 lb. per sq.	Asphalt felt, per 100 lb.	Tar felt, per 100 lb.	Asphalt coating per gal.	Tar pitch 360 lb. bbl. per ton
Atlanta	$19.25	$28.275	$3.59	$3.86	$3.31	$3.15	$2.95	$2.95	$0.63	$57.75
Baltimore	19.00	27.90	2.75	4.25	3.35	2.78	4.25	4.25	.48	50.18
Birmingham	19.25	28.275	3.90	3.40	....	3.37	2.80ii	2.80ii	.87ff	42.65ee
Boston	19.00	27.90	....	....	....	3.30gq	2.83og	2.83og	.45g	56.00g
Chicago	19.00	27.90	....	....	....	3.57‡u	3.00‡o	3.00‡o	43.50‡bbe	55.70‡
Cincinnati	19.00	27.90	....		....	3.15	2.63	2.63	.594y	52.36
Cleveland	19.00	27.90	2.353pgg	2.587gg	2.764gg	3.15q	2.62o	2.62o	.464y	47.00hh
Dallas	19.25	28.65	....	3.13B	....	3.50q	3.75o	4.35o	.464	58.50hh
Denver	19.50	28.40	3.29	5.15	3.04	2.84	2.30o	2.30o	.48ff	45.00
Detroit	19.00	27.90	2.35	3.25	2.50	2.656	2.409	2.409	.53	47.30
Kansas City	19.00	28.65	3.64	3.12	2.76	3.65ii	3.49o	3.49o	.58y	83.70
Los Angeles	19.00	28.15	3.30n	4.50n	4.20n	3.20n	2.15en	l	.70my	l
Minneapolis	19.00	29.88/28.02	....	....	....	2.835dd	2.358hidd	2.358hidd	.46idd	48.00v
Montreal	......	21.95	5.02Dfft	5.94Efft	4.65Ffft	5.25f	4.65f	4.65f	1.60	..
New Orleans	......	......	....	....	....	3.15	2.62	2.62	0.756	..
New York	19.00	27.90	....	....	....	2.84G	2.36Go	2.36Ge	.463Gs	48.00*
Philadelphia	19.00	27.90	3.60	3.40/3.65	3.50/4.60	2.54	2.94	2.94	.37	26.00
Pittsburgh	19.00	27.90	3.10	3.38	3.68	3.72	2.85o	2.85o	.42	58.75
St. Louis	19.00	27.90	....		....	2.86s	2.36h	2.36h	.46y	54.35
San Francisco	19.00	28.15	2.95	4.15	3.40	2.70	1.85••	2.84aa	.56	54.00
Seattle	19.00	28.40	3.47mcc	4.19mcc	....	3.84mqce	3.33hmce		.55mce	47.20m..
Toronto	......	......	....	....	....	4.45	4.10e	4.65o	1.7 j	88.00A

•‡ Delivered. • Note: Red lead in oil 50¢ higher than white lead in oil. •a Red lead prices change frequently due to pig lead price changes. •b U. S. War Dept. Spec. 3-49A. •c ASTM Spec. D266-31. •d 80% minimum ferric oxide. •e 15 lb. •f Per 432 sq. ft. •g F.o.b. yard, Roxbury. •h Per roll, 65 lb. •i Net carload lot prices; Minneapolis and vicinity. •j 45 gal containers. •k Per cwt. •l Not used. •m 1% discount for cash. •n F.o.b. city. •o Per 60-lb. roll. •p 6-drum, 50 gal. ea. •q Per 90-lb. roll. •r F.o.b. factory, Chicago. •s Truckload. •t Federal tax included, add 5% mun. & prov. tax. •u Per 90-lb. square. •v Per ton. •x Mineral surfaced. •y 55-gallon container •z Drums. •aa 15 lb., 324 sq ft roll. •bb Roofers coating and cement; Price per ton •cc LCL, truck delivery. •dd 2% cash discount. •ee Asphalt pitch in 100 lb. packages •ff 5-gal. drums. •gg F.o.b. factory. •hh Incl. freight. •ii Per roll. •A 400 lb barrels •B ASTM Spec D-962-49. •D Std. Black. •E Ready-mixed. •F Over 80% ferric oxide. •* Aver. wt. approx. 425 to 550 lbs. drums. •G F.o.b. factory points

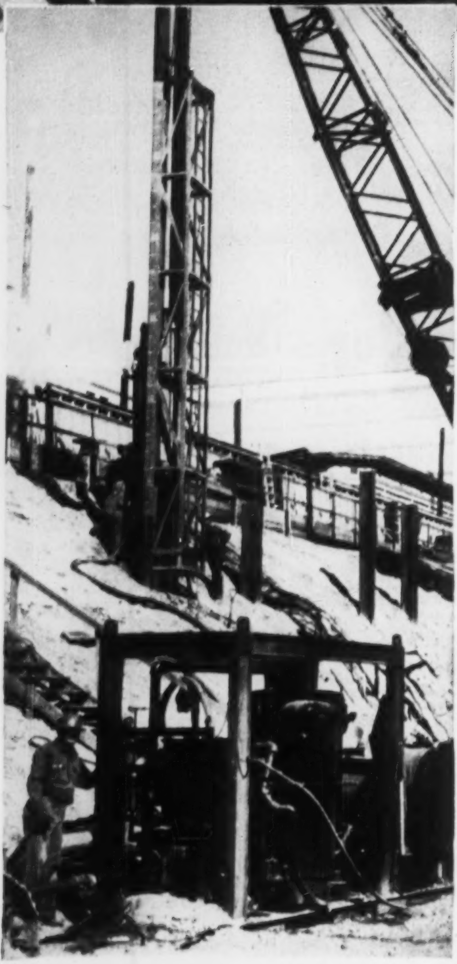
PLASTER, VERMICULITE AND METAL BUILDING SHEETS & TUBING

	PLASTER† Neat per ton	Gauging per ton	VERMICULITE† Home Insulation pellets	Plaster aggregate	Concrete Aggregate Untreated (per bag of 4 cu ft)	PERLITE Plaster Aggregate	Concrete Aggregate Untreated	ALUMINUM SHEETh Flat j .102" th 36"x96" & 48"x144" per lbt	Corr roof .032" th 35"x12" per shu	STAINLESS STEEL SHEET*-TYPE 302g 20 ga 48"x96 120" per cwthh	28 ga 36"x120" per cwtmm	COPPER WATER TUBING-TYPE L 2000 ft lots per fta ⅜"b	½"c
Atlanta	$30.00	$36.00	$1.55s	$1.45s	$1.80d	$1.40	$1.40	$0.422n	$6.57v	$61.44n	$67.50m	$18.11f	$25.41f
Baltimore	22.85	33.25	0.95	1.15	1.15	1.15	1.65	0.391	0.427r	56.25	64.25	0.1951	0.2745
Birmingham	38.00	43.00	1.55	1.55	1.80l	1.55	1.55	0.475	9.52	62.26	70.76	0.1811	0.2541
Boston	22.00	29.00	1.15/1.20	1.18/1.23	1.45	1.45	1.50	0.505	28.56op	59.373dd	65.51ddff	0.1811	0.2541
Chicago	26.80	26.80	1.55	1.60	1.60l	1.50	1.50	0.474	9.805#p	62.40#ee	70.90#ee	0.1811	0.2541
Cincinnati	21.60*•	21.60*•	1.75	1.75	1.75	1.38	1.44	0.400	8.66	60.95	66.70ff	0.1811	0.2541
Cleveland	28.00	43.00	1.13	1.16	1.24l	1.45	1.45	0.44aa	8.66	62.43	70.93	18.11f	25.41f
Dallas	29.80	31.80	1.20	1.25	1.30l	1.21	1.32	0.379	0.439r	55.00	63.00	0.1449	0.2029
Denver	25.00	25.00	1.45	1.35	1.50	1.40	1.55	0.444	9.80	60.19gg	70.69gg	0.1811	0.2541
Detroit	25.00	25.00	1.28	1.32	1.41	1.54	1.61	0.455	9.235	62.50#	71.00#	15.22foo	28.83f
Kansas City	30.00	35.00	1.20	1.30	1.40	1.35	1.50	0.451	10.95	62.32	70.32	20.54f	28.83f
Los Angeles	26.20	27.20	1.25ii	1.20ii	1.25ii		1.60	0.484	8.99	61.85	82.10	0.2054	0.2883
Minneapolis	32.00	32.00	1.50	1.60	1.80	1.40	1.40	0.481	9.00	62.96	76.46ff	0.1851	0.2541
Montreal	28.80	33.20	1.10	1.30	1.30	1.15t	1.15t	0.437	9.25	66.50		0.264	0.322
New Orleans	32.00	45.00	1.25	1.25	1.35	1.25	1.25	0.422	8.303	62.04	70.54	0.1987	0.2796
New York	24.00	30.00	1.25	1.25	1.30	1.30	1.30	0.474#o	9.46#	63.23	71.73	18.11f	25.41f
Philadelphia	23.25	32.00	1.35	1.35	1.40			26.50#wz	7.50#	53.23#	60.98#	18.57f	26.00f
Pittsburgh	27.50	31.00	1.30	1.30	1.32	1.35	1.35	0.42	9.19	56.81	62.63	0.2045	0.2572
St. Louis	29.00	40.00	1.30	1.55jj	1.50	1.60	1.45	0.487	9.80	62.83	69.08	18.11fm	25.41fm
San Francisco	27.85	32.00	1.15	1.15	1.36	1.15	1.15	0.49	8.90cc	66.99	75.47	0.1811	0.2541
Seattle	38.00	41.00	1.45	1.25k	1.85l	1.40k		0.422	8.303	64.10	72.60	0.1951	0.2745
Toronto	32.50	42.00	1.20	1.30	1.35			0.412	24.00	71.00	80.50	0.3289pp	0.4136pp

† trucklots, delivered * carload # delivered •a fob city •b ½" O.D. •c ⅝" O.D. •f per 100 ft •g 5 tons & up; cold roll. anneal & pickled; 2B finish •h 15M lb •j 1100 & 3003 alloy, mill finish •k per bag of 3 cu ft •l treated with air entraining agent •m 2-10M ft •n fob plant, fr allow •o 5M lb & up •p 100 sq ft quantity •r per lb •s 30# bag •t 36" x 96; 10.81 lb/sh; 48" x 144"; 21.7 lb/sh •u 19.31 lb/sh •v fob plant •w 48" x 144" •x 36" x 96" $13.25/sh •aa 16M lb & up •bb fob mill •cc 26" x 8-12' •dd add $0.75 cwt for boxing •ee 4 tons & up •ff 26 ga •gg add $2/cwt boxing; $0.75/cwt on skids •hh Theoretical wt for 48" x 96"; 50.4-lb, per sh. •ii 300-bag lots •jj per 100-lb bag •mm Theoretical wt: 19.7-lb per sh. •nn Deliv, warehouse means •oo ¼" O.D. •pp Incl 10% sales tax

• Next Report: See ENR Dec. 27

Continued on page 165



McKiernan-Terry Equipment helps to construct world's biggest basement

The 4-acre, 4-level basement for Denver's huge Court House Square development required piles driven around the entire perimeter of more than 1,750 feet and also for the drainage pump cofferdams.

Steel H-beams of various sizes and lengths were used, and the piles were driven by McKiernan-Terry 9B3 and 11B3 Double-Acting Pile Hammers. A McKiernan-Clayton Steam Generator was also used to power the larger hammer. The entire project was designed and supervised by the consulting engineering firm of Proctor, Mueser & Rutledge of New York, the work was done by Webb & Knapp Construction Corp. of New York and Denver, and the McKiernan-Terry equipment was supplied by Mississippi Valley Equipment Co. of St. Louis, Mo.

For your own pile-driving operations, whether large or small, you, too, can depend upon speedy, economical service from McKiernan-Terry equipment. Write for descriptive bulletins and specifications.

BUILD BETTER ROADS TODAY · FOR A GREATER AMERICA ·
See you at the
ROAD SHOW
CHICAGO
Jan. 28-Feb. 2, 1957

BOOTH 608

McKIERNAN-TERRY CORPORATION

MANUFACTURING ENGINEERS
80 Richards Ave., Dover, N. J.
DOVER, NEW JERSEY

MK370

Materials and Labor Prices November Market Quotations by ENR Field Reporters

BUILDING BOARD & LATH AND INSULATION—DELIVERED TRUCKLOAD LOTS

	GYPSUM PLASTER BOARD tapered edge per Msq ft ½"	GYPSUM PLASTER BOARD tapered edge per Msq ft ⅝"	GYPSUM BOARD LATH plain or perf per Msq ft ⅜" x 16" x 48"	GYPSUM SHEATHING tongue & groove per Msq ft ½" x 2' x 8'	FIBER BOARD SHEATHING asph impreg & coat per Msq ft ½" sq ed	FIBER BOARD SHEATHING asph impreg & coat per Msq ft 25/32" T&G	FIBER BOARD INSULATION sq edge, paint per Msq ft ½"	MINERAL WOOL INSULATION† loose, per 40-lb bag a	MINERAL WOOL INSULATION† 3" batts per M sf	GLASS FIBER INSULATION† loose, per 40-lb bag a	GLASS FIBER INSULATION† 3" batts per M sf	ALUMINUM FOIL 80# Kraft 1 side foil per roll of 250 s. f.	ALUMINUM FOIL Expansible Blanket 2 layers foil per Msq.ft
Atlanta	$70.00	$60.00	$43.00	$70.00	$70.00	$127.00	$77.00	$1.00	$60.00	$1.65b	$65.00	.....	.....
Baltimore	51.25f	44.75f	32.55f	55.00f	65.00f	108.50f	69.00f	1.30	66.50	1.60	45.00	$4.00g	$33.50
Birmingham	73.00	60.00	47.77	75.00	80.00	134.00	79.00	1.40	70.00	1.60	75.00	2.99g	.....
Boston	57.00m	46.50m	33.00m	52.00m	64.00m	109.00m	79.00hn	1.45	70.00	....	53.00	6.00	55.50
Chicago	67.00	52.00	43.00	62.00	85.00	123.00	85.00	1.85	80.00	....	63/65bb	5.25e	....
Cincinnati	46.40w	41.60w	30.80w	49.81w	67.50w	120.00w	70.00w	1.25	60.00	1.25	73.50	3.12j	50.00w
Cleveland	60.50	55.00	40.00	65.00	70.00	111.00	70.00	1.35/1.50	75.00	1.60**	57.50**	17.50*	50/55
Dallas	58.00	55.00	42.50	65.00	73.50	122.50	70.00	1.90	65.00	1.35	65.83	4.25	.....
Denver	62.00	54.50	41.00	62.00	75.90	126.00	74.90	....	71.00l	1.20e	55.00	11.00r	21.00
Detroit	57.50	49.75	36.00	60.00	58.50	98.00	57.50	....	.....	1.95b	83.00	....	.....
Kansas City	65.00	55.00	40.00	65.00	72.00	120.00	75.00	1.40	80.00	1.40	80.00	11.24dt	19.44
Los Angeles	64.00	59.00	0.325x	66.50	71.87	121.25	80.00	....	83.00	1.35s	64.00	4.20y	.....
Minneapolis	80.00	70.00	0.40r	80.00	70.00	140.00	78.00	1.60	80.00	1.80	80.00	6.00	.....
Montreal	56.00	48.00	36/39	53.00	60.00	.....	63.00	1.30	56.00	1.30	56.00	18.00e	56.00
New Orleans	55.00	48.00	45.00	70.00	75.00	125.00	72.50	1.75	68.00**	....	.....	.....	.....
New York	53.00	45.50	35.00	54.00	69.00	109.00	70.50	1.55	65.00	1.90a	67.00	5.20t	48.80cc
Philadelphia	50.00	48.00	34.00	48.50	67.50	105.00	49.20	....	63/70	....	70/75	5.50/6	34.50/44.5
Pittsburgh	65.00	55.00	40.00	68.00	65.00	105.00	60.00	1.90	72.00	1.90	72.00	4.10	.....
St. Louis	62.00	55.00	39.00	65.00	65.00	110.00	75.00	1.60	80.00	1.65	62.00	6.67i	.....
San Francisco	53.00c	45.00	0.34x	57.00	60.00	101.00	59.00	1.60	66.50	1.55	66.50	4.95	55.00
Seattle	66.00	57.50	46.50	65.00	74.50	125.00	73.50	1.60y	74.00	1.60aaa	50.00aa	4.25g	46.50
Toronto	61.00	50.00	38.00	64.50	75.00	.....	.....	1.40	60.00	....	60.00	17.00o	45.45

*a for hand packing *b per 30# bag *d 40# kraft paper *e 20# sq ft bag, 4" thick *f full trailer loads *g 80# kraft paper backing *h LCL *i 40 lb roll *j 80 lb roll *l flame-proof $75.00 *m 10 ton quantities *n distributor's siding *o per Msf roll *p per sf *r per cwt *s per 35# bag *t per M sq ft *w fob city *x per sq. yd. *y 26# bag *z 32# bag *aa fob warehouse *bb 2" *cc in 250 sf rolls, of 16", 20", or 24" width.

HOURLY WAGE RATES—Base rate + fringe benefits

	Bricklayers	Carpenters	Struct. Iron Workers	Hoisting Engineers	Plasterers	Electrical Workers	Steamfitters	Common Labor Building	Common Labor Heavy Const
Atlanta	$3.35	$2.80	$3.05	$2.80	$3.00	$3.20	$3.20+25¢[cc]	$1.45	$1.45
Baltimore	3.45+10¢[d]	2.95+7½¢[t]	3.50+7½¢[t]	2.70/2.95+10[Qd]	3.25+7½¢[t]	3.30	3.20+7½¢[t]	1.60+7½¢[t]	1.60+7½¢[t]
Birmingham	3.50	2.70	3.00+7½¢[k]	2.52	2.92	3.175	3.17+10¢[v]	1.50	1.60
Boston	3.50+10¢[d]	3.05+10¢[d]	3.55+7½¢[k]	3.50	3.50+20¢[I]	3.30+12¢[R]	3.20+10¢[d]	2.30+7¢[Y]	2.30+7¢[Y]
Chicago	3.62½+7½¢[k]	3.35+10¢[e]	3.55+7½¢[k]	3.25+5¢[m]	3.54+23¢[y]	3.48+21¢[f]	3.37+22¢[aa]	2.57½+7½¢[k]	2.57½+7½¢[k]
Cincinnati	3.60	3.30	3.35+7½¢[k]	3.075/3.325	3.375	3.50+3¢[N]	3.50+9½¢[Z]	2.35	2.25
Cleveland	3.55+10[e]	3.575	3.50+7½¢[k]	3.575	3.575	3.60	3.375+10¢[d]	2.825	2.75
Dallas	3.70	2.95	3.12½+7½[k]	3.075	3.437+7½¢[k]	3.12½+7½¢[k]	3.10+7½¢[k]	1.55	1.55
Denver	3.625	3.075	3.00+7½¢[t]	2.93	3.30+7½¢[t]	3.00	3.17+15¢[D]	2.00	2.00
Detroit	3.53+20¢[ve]	3.20+29¢[q]	3.47½+20¢[P]	3.20+20¢[ezz]	3.51+24¢[el]	3.50+30½¢[H]	3.45+14¢[B]	2.45+20¢[ezz]	2.55+10¢[e]
Kansas City	3.70	2.95	3.075	3.065	3.375	3.325[O]	3.15+7½¢[k]	2.155	2.18
Los Angeles	3.80	3.90+10¢[d]	3.40+10¢[e]	2.95+10¢[d]	3.75+12½¢[S]	3.60	3.525+10¢[d]	2.30+7½¢[k]	2.30+7½¢[k]
Minneapolis	3.425	3.00	3.17	2.95	3.10+23[Gee]	3.12[n]	3.00+20[de]	2.25	2.25
New Orleans	3.25+5¢[m]	2.725	3.10+7½¢[k]	2.80+7½¢[k]	2.82½+5¢[m]	3.025+7½¢[k]	3.05+15¢[e]	1.55	1.55
New York	4.05+36¢[br]	3.65+292¢[be]	3.95+34¢[p]	3.90+31¢[J]	4.00+50¢[A]	3.50+38¢[eF]	3.85+35¢[bL]	2.60+21¢[V]	2.60+21¢[V]
Philadelphia	3.75+17¢[i]	3.385	3.55+18¢[iM]	3.15½/3.90½+10¢[e]	3.65+15¢[C]	3.77+15¢[ue]	3.75+11½¢[u]	2.10	2.40
Pittsburgh	3.75+17½¢[ke]	3.325+7½¢[k]	3.30+7½¢[k]	3.35+7½¢[k]	3.40+17½¢[ke]	3.50	3.425+7½¢[k]	2.25+5¢[m]	1.98+10¢[d]
St. Louis	3.75+19¢[c]	3.25+7½¢[k]	3.25+7½¢[k]	3.325	3.425+7½¢[k]	3.60+25¢[c]	3.55+21¢[E]	2.30+7½¢[k]	2.30+7½¢[k]
San Francisco	3.75+12½¢[e]	3.25½+10¢[e]	3.40+10¢[e]	2.98+10¢[e]	3.61+20¢[ee]	3.37½+23¢[U]	3.45+46¢[K]	2.325+10¢[e]	2.325+10¢[e]
Seattle	3.55+10¢[d]	2.80+10¢[d]	3.07+10¢[d]	2.90+10¢[d]	3.27½+10¢[d]	3.20+19½¢[X]	3.15+21¢[T]	2.37+10¢[d]	2.37+10¢[d]
Montreal	2.10+14¢†	1.90+14¢†	2.00+14¢†	1.80+14¢†	2.12+18¢†	2.10+18¢†	2.12+18¢†	1.30+10¢†	1.30+10¢†
Toronto	2.61+10¢**	2.40+10¢**	2.40+10¢**	2.50+10¢**	2.45+18¢**	2.65+10¢**	2.44+10¢**	1.50+6¢**	1.50+6¢**

ENR Skilled Average (Bricklayers, Carpenters, Iron workers): $3.424. **ENR Common Average** $2.192

* Cost of living bonus now included in basic wage. † 8% fringe benefits. ** 4% vacation fund. *a 6 hr. day. *b 7 hr. day. *c 3% vac. stamp fund plus 7½¢ WF for bricklayers; 4% VF for electricians plus 8¢ WF, 1% PF. *d 10¢ H&WF. *e 10¢ VF. *f 6% WF. *g 11½¢ WF. *h $2.85 homes & housing plus 7½¢ WF. *i 17¢ WF. *j 10½¢ hr. WF. *k 7½¢ hr. WF. *14% VF. *m 5¢ hr. WF. *n Plus 11% fringe benefits on gross wage ea. yr. *o 10¢ PF. *p 3% WF, 3% PF. *q 10¢ ins; 6% vac. and holiday pay. *r 4% WF and 20¢ PF. *s 5% W&PF, 4% VF, 1% NC, 6 PH. *t 7½¢ H&WF. *u 1½% PF. *v 10¢ WF. *w Negotiating. *x 5¢ VP. *y 23¢ WF. *z 5¢ HP. *A 15¢ WF, 15¢ PF, 20¢ B.F. *B 7½¢ VP, 5¢ PF, 1½¢ EF. *C 15¢ WF. *D 10¢ H&WF, 5¢ organ. *E 6% WF, plus travel pay per day. *F Plus $4 per day Annuity contrib. *G 3¢ Prom *H 7¢ WF, 6% VF. *I 15¢ H&WF, 5¢ for Advtg. *J 5% WF, 6 PH. *K 25¢ W & PF, 15¢ VF. *L 3% WF, 3% PF, 2% VF, 1% EF. *M 7½¢ PF. *N 1% WF. *O 10¢ W, 1% NECA. *P 10¢ hosp. ins.; 5¢ vac., 5¢ VF. *Q 1 drum, 2 drums 3.40/3.55 +10¢. *R 12¢ WF and 1¢ apprentice. *S 12½¢ H and WF. *T 21¢ H, W & VF. *U 7½¢ WF, 4% VF, 1% PF. *V 5% WF, 3% PF. *W 2% F. *X 12¢ VF, & 7½¢ H & WF. *Y 7¢ H & WF. *Z 9½¢ WF. *aa 7¢ WF, 15¢ PF. *bb 8¢ WF. *cc 25¢ WF.

	Truck drivers 1½ T	Truck drivers −4 cy	Truck drivers +4 cy	Tractor Operators incl. bulldozers 34-49 hp	Tractor Operators incl. bulldozers 70-100 hp	Tractor Operators incl. bulldozers 100 & over	Tractor scraper 15-18 cy	Power cranes & shovels ½ cy	Power cranes & shovels ¾ cy	Motor grader oper	Air comp oper	Air tool oper
Atlanta	$1.75	$	$	$2.525	$2.525	$2.525	$2.525	$3.05	$3.05	$2.525	$2.30	$1.67
Baltimore	1.60+7½¢[a]	1.75+7½¢[a]	1.85+7½¢[a]	2.85/3.30[b]	2.85/3.30[b]	2.85/3.30[b]	2.85/3.30[b]	3.40/3.55+10¢[m] [b]	3.40/3.55+10¢[bm]	2.85/3.30[b]	2.85/3.30[b]	2.25
Birmingham	1.60	1.79[ff]	2.05[gg]	2.66	2.66	2.66	2.80	2.80	2.80	2.76	2.385	1.75
Boston	2.195[c]	.....	.....	3.025[d]	3.025[d]	3.025[d]	3.025[d]	3.40	3.40	3.40	2.95	2.45+7¢[e]
Chicago	2.08+12¢[rr]		.....	3.00+5¢[e]	3.15+5¢[e]	3.05+5¢[e]	2.85+5¢[e]	3.60+5¢[e]	3.60+5¢[e]	2.95+5¢[e]	2.95+5¢[e]	.....
Cincinnati	2.20[oo]	2.30[oo]	2.40[oo]	3.075	3.075	3.075	3.075	3.325	3.325	3.325	3.325	3.325
Cleveland	2.50+10¢[m]	2.50+10¢[m]	2.50+10¢[m]	3.325	3.325	3.325	3.325	3.575	3.575	3.325[k]	3.20	3.20
Dallas	1.55	1.55	1.55	1.55/2.625[l]	1.55/2.625[l]	1.55/2.625[l]	1.55/2.625[l]	1.55/2.625[l]	1.55/2.625[l]	1.55/2.625[l]	1.55/2.00[l]	1.70/2.00[l]
Denver	2.15	2.15	2.25	2.15	2.76	2.76	2.76	2.93	2.93	2.76	2.76	2.35
Detroit	2.45	2.45	2.45	3.30+10¢[m]	3.30+10¢[m]	3.30+10¢[m]	3.30+10¢[m]	3.30+10¢[m]	3.30+10¢[m]	3.30+10¢[m]	3.025+10¢[m]	2.88+20¢[mm]
Kansas City	2.115[n]	2.115[e]	2.19[p]	2.30	2.85[q]	2.85[q]	2.85[p]	3.095	3.095	2.71	2.85[t]	2.24
Los Angeles	2.405+7½¢[a]	2.405+7½¢[a]	2.435+7½¢[a]	3.05+10¢[m]	3.05+10¢[m]	3.05+10¢[m]	3.30+10¢[m]	3.30+10¢[m]	3.30+10¢[m]	3.30+10¢[m]	2.54+10¢[m]	2.51+7½¢[a]
Minneapolis	2.25	2.25[y]	2.40[z]	2.63	2.85[q]	3.07[x]	2.85	3.07[y]	3.33[z]	2.63	2.52	2.35
New Orleans	1.675	1.925	1.925	2.15+7½¢[u]	2.80+7½¢[u]	2.80+7½¢[u]	2.80+7½¢[u]	2.80+7½¢[u]	2.80+7½¢[u]	2.80+7½¢[u]	2.15+7½¢[u]	1.625
New York	2.21[aa]	2.75+14¢[hh]	2.75+14¢[hh]	3.27½+262¢[cc]	3.27½+262¢[cc]	3.27½+262¢[cc]	3.40+272¢[cc]	4.15+332¢[cc]	4.15+332¢[cc]	3.40+272¢[cc]	3.40+272¢[cc]	3.00+15¢[ss]
Philadelphia	—— 1.925/2.15+7½¢[a] ——			—— 3.15½/3.90½+10¢[m] ——			3.15½/3.90½+10¢[m]	—— 3.15½/3.90½+10¢[m] ——		3.15½/3.90½+10¢[m]	2.97½+10¢[m]	2.13½+10¢[m]
Pittsburgh	2.20+7½¢[a]	2.20+7½¢[a]	2.20+7½¢[a]	2.87½+7½¢[a]	3.20+7½¢[a]	3.27½+7½¢[a]	3.025+7½¢[a]	3.35+7½¢[a]	3.35+7½¢[a]	3.25+7½¢[a]	3.35+7½¢[a]	2.20+7½¢[a]
St. Louis	2.30+7½¢[aaa]	——	——	3.325[bb]	3.325[bb]	3.325[bb]	3.325[bb]	3.325[bb]	3.325[bb]	3.325[bb]	2.775[bb]	2.775[bb]
San Francisco	2.32½+10¢[m]	2.32½+10¢[m]	2.465+10¢	3.095+10¢[m]	3.095+10¢[m]	3.095+10¢[m]	3.095+10¢[m]	3.425+10¢[m]	3.425+10¢[m]	3.255+10¢[m]	2.705+10¢[m]	2.425+10¢[m]
Seattle	2.63+7½¢[unn]	2.63+7½¢[udd]	2.83+7½¢[uee]	2.78+10¢[m]	2.95+10¢[m]	2.95+10¢[m]	2.95+10¢[m]	3.36+10¢[m]	3.36+10¢[m]	3.10+10¢[m]	2.78+10¢[m]	2.52+10¢[m]
Montreal	1.30+10¢[ll]	1.30+10¢[ll]	1.30+10¢[ll]	1.73+14¢[ll]	1.73+14¢[ll]	1.73+14¢[ll]	1.73+14¢[ll]	1.99+16¢[ll]	1.99+16¢[ll]	1.73+14¢[ll]	1.80+15¢[ll]	1.60+15¢[ll]
Toronto	1.53+6¢[ii]	1.53+6¢[ii]	1.59+6¢[ii]	1.90+8¢[ii]	2.00+10¢[ii]	2.00+10¢[ii]	1.90+8¢[ii]	2.50+16¢[ii]	2.50+16¢[ii]	——	2.05+8¢[ii]	2.05+8¢[ii]

*a 5¢/hr HWF *b lower rates, straight time, other broken *c 2-axle; 10-wheel $2.25; Euclid $2.45 *d Intermediate *e bldg constr; highway $2.55+7¢ WF *f less than 2-1 *j plus $2 pd by employer for hosp. death benefits to family *k bldg constr; steel constr $3.475 *l higher rates are union, other taken from min wage scale approved by County Commissioners Court *m 10¢ H&WF *n flatbed *o under 10 cy *p over 10 cy *q over 50 hp *r blade grader *t single *u 7½¢ HWF *x cat oper *y up to 3½ cy *z 3½ cy & over *aa plus W & PF *bb 3% WF, 2% PF, 11 PH *cc 4% WF & 4% PF *dd up to 5 cy *ee 5 cy & over *ff over 1½ T but not over 3 *gg up to 5 tons *hh excavating *ii 4% VP *kk 7½¢ WF included in base pay *ll 8% fringe benefits *mm 10¢ H & WF, 10¢ insurance *nn 8 cy or less; 8-16 cy $2.90; 16-25 cy $3.15 *oo Plus $2.25/wk WF *rr 12¢ WF *ss 5% WF.

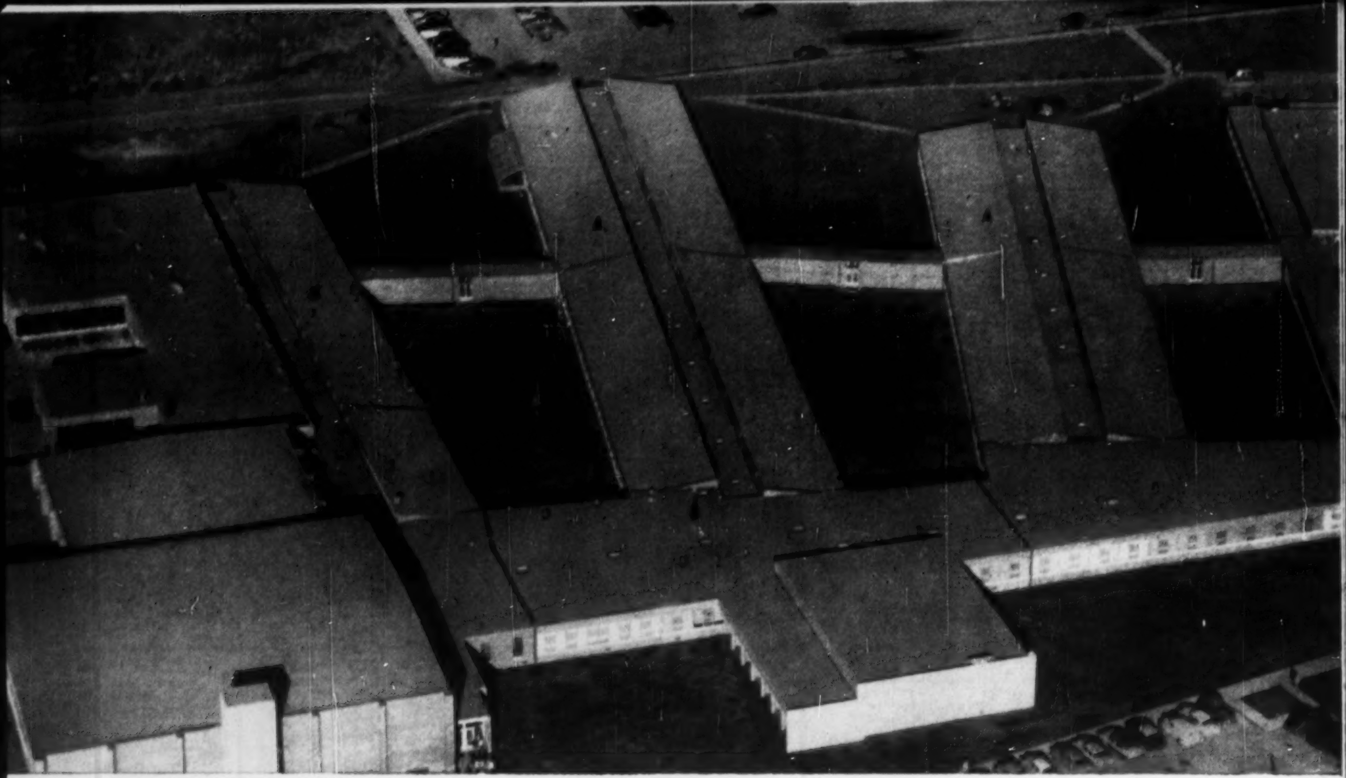
MEXICO CITY PRICES

In Pesos, F.o.b. City		Aug. '56	Sept '56
Common Wages—Building (8 hr. day) (Peons)	av. per hr.	1.38	1.38
Common Wages—Heavy Const. (8 hr. day) (Peons)	av. per hr.	1.38	1.38
Skilled Labor Wages			
Carpenters (8 hr. day) 1 cl.	av. per hr.	2.48	2.48
Bricklayers (8 hr. day) 1 cl.	av. per hr.	2.48	2.48
Struct. Iron Workers (8 hr. day)..... Remachadores.	av. per hr.	3.77	3.77

Struct. Steel, Shapet		Aug. '56	Sept. '56
3"-15" x 12 meters	per metric ton	2100.00#	2100.00#
# fob Monterrey			
Reinf. Steel, Corr. Rods			
[illegible]" x 11 meters	per ton	1825.00	1825.00
[illegible]" x 11 meters	per ton	1800.00	1800.00
[illegible]" x 11 meters	per ton	1800.00	1800.00
[illegible]" x 11 meters	per ton	1800.00	1800.00
[illegible]" x 11 meters	per ton	1800.00	1800.00
1" x 11 meters	per ton	1800.00	1800.00

Gravel truck load at 3½ cu. meters		Aug. '56	Sept. '56
Blue Gravel	per tr. load	75.00	75.00
Rose Gravel	per tr. load	69.00	69.00
Cement, Std. Port. (Tolteca)	per ton	240.00	240.00
Lumber			
1" Pine	per M ft.	1825.00	1825.00
1½" Pine	per M ft.	1900.00	1900.00

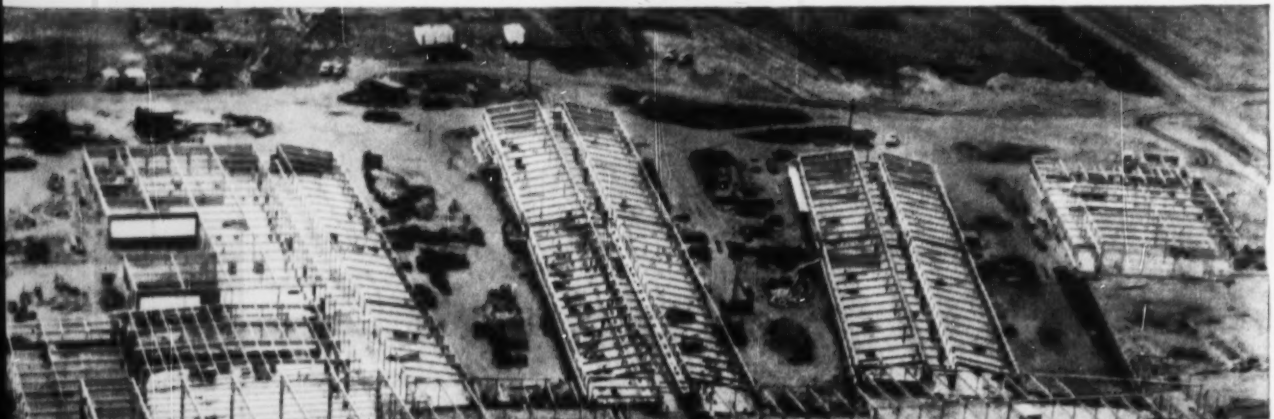
- Next report: See ENR Jan. 3, 1957



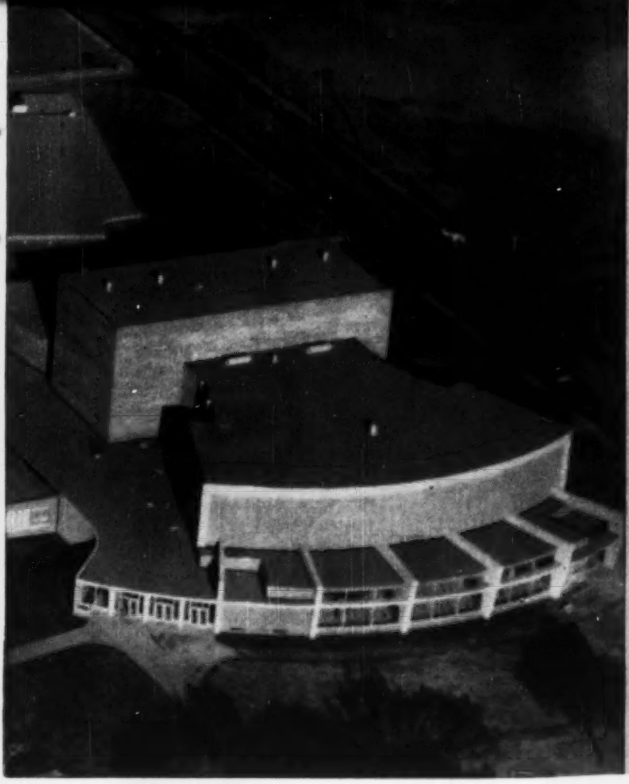
SENIOR HIGH SCHOOL, GRAND ISLAND, NEBRASKA. *Architect:* McNett, Stanage & Company, Grand Island. *General Contractor:* H. S. Holtze Construction Company, Sioux City, Iowa. *Steel Fabricator:* Paxton & Vierling Steel Company, Omaha, Nebraska.

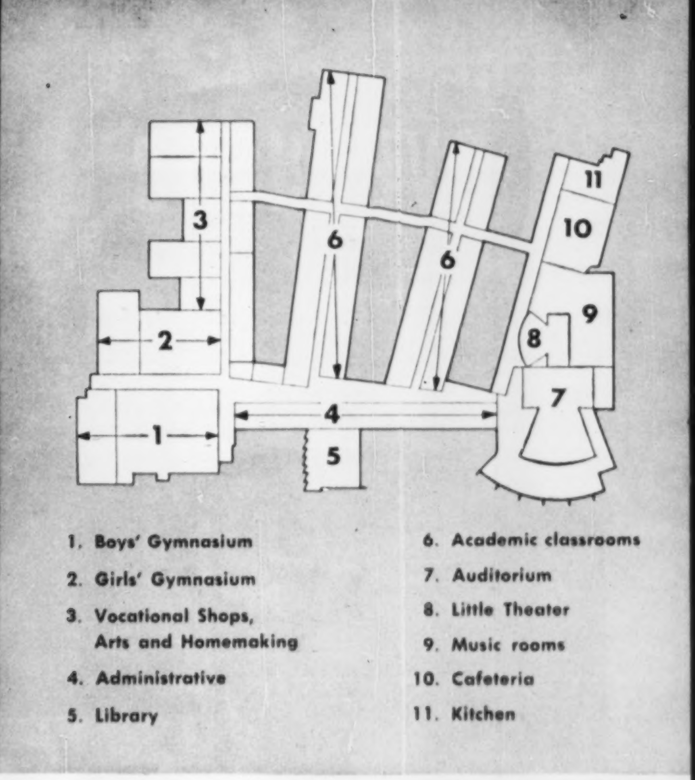
Functional, economical "finger plan" of Grand Island

THE STRUCTURAL STEEL FRAMEWORK NEARING COMPLETION. Starting date for the school was October, 1953, and it was completed in July, 1955. Total cost of the school was $2,622,795.00.



UNITED STATES STEEL USS





High School *again illustrates versatility of Structural Steel!*

The basic design of the new senior high school in Grand Island, Nebraska, consists of four "fingers," or wings, containing classrooms, radiating from a main administrative area. The "fingers," which extend toward the west, are oriented at slightly different angles from each other in order to secure the best lighting and ventilating situations. And, in addition to being connected to the administration area, each "finger" is joined to the others by means of a corridor—for quick passage from one wing to another. The school is sized to accommodate approximately 1,400 students. All areas are of one-story construction.

The unique building houses two gymnasiums, one of which will seat 2,600 spectators for varsity basketball games. The main auditorium will accommodate 1,500 people comfortably, and the Little Theater can seat 300. In both, stages are equipped to handle even the most intricate of productions. The ultramodern cafeteria, which turns out 600 to 700 meals with ease during the short lunch period, may be converted quickly into a study hall through the use of motorized rolling doors. The whole effect of the school is one of efficiency coupled with luxury. Yet, it was built at a cost of only $10.96 per square foot.

Approximately 1,017 tons of Structural Steel were used in the framework of the new building—contributing greatly to the economy of construction. As is usually the case, when economy must go hand-in-hand with imaginative architectural ideas, Structural Steel is called upon. And why not? Structural Steel is versatile. It's the strongest, most economical of load-carrying materials—effectively resists tension, torsion, compression and shear. Once enclosed in buildings, it lasts indefinitely, requiring no maintenance. Structural Steel may be riveted, bolted or welded, and may be erected in any weather. And since steel members are fabricated indoors, weather can have no effect on the quality of workmanship. For further details, return the coupon.

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TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

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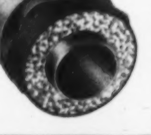
PREFABRICATED INSULATED PIPING SYSTEMS

BARBERTON, OHIO

IN CANADA: THE Ric-wiL COMPANY OF CANADA LIMITED

Write for a copy of the new Ric-wiL Catalog . . .

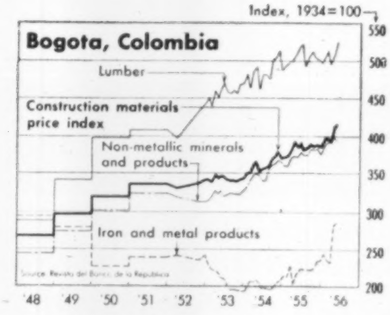


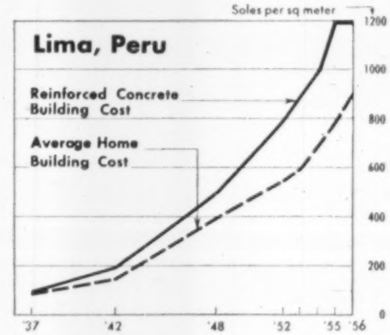
Construction Cost Trends Around the World

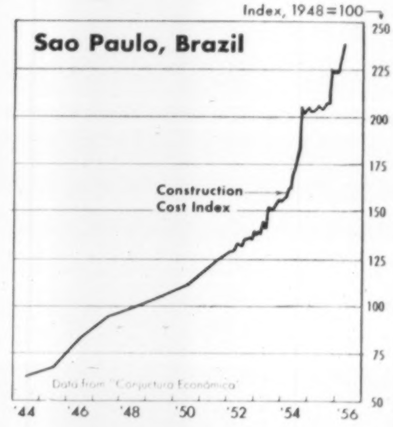
The upward pressure of construction materials prices and wages during 1956 is worldwide. Imported items are frequently at a premium, particularly where foreign exchange difficulties crop up. In more than half the countries surveyed by ENR this year, the boom continues despite material shortages and lack of skilled labor. Unskilled labor is generally plentiful and pressed into service with on-the-job training.

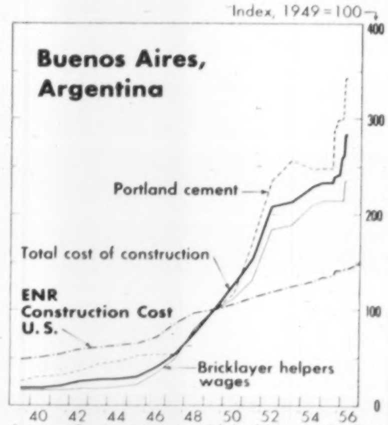
In other countries, construction activity is being throttled by runaway prices, credit restrictions, and uncertain political conditions. However, backlogs of work remain large, particularly in underdeveloped countries.

Foreign contractors, with their up-to-date equipment and records for on-time completions, are favored for major public projects despite some restrictions favoring local contractors and labor.









Source Construcciones, published by Camera Argentina de la Construccion

Central and South America

• **Bogota, Columbia,** has fairly adequate supplies of construction materials, but delays in deliveries have developed as production lags behind expanding construction activity. Labor is reasonably adequate, but not plentiful.

• **Buenos Aires, Argentina,** reports construction costs soaring into new high ground as both labor and materials prices move upward sharply. Shortages of structural steel, cement, and wood casings for cement forms continue. One round of wage increases was granted as of February and another was negotiated in mid-year.

• **Caracas, Venezuela,** construction activity is on a par with last year, though plans for new structures to house 13 government ministries plus dams, highways, and industrial projects should stimulate the industry in 1957. There are reports of overproduction of cement, paint, commercial building, and high-rent apartments. The general materials price index in 1955 was the lowest since 1946. While there is no over-all labor shortage, there is a lack of native skilled labor. Immigrants form the bulk of the skilled labor supply, but employers are required by law to hire 75% Venezuelans.

• **Ciudad Trujillo, Dominican Republic,** has ample supplies of both labor and construction materials. An extensive public construction program covering roads, expressways, harbor and port improvements, and immigrant housing projects stimulated construction activity this year.

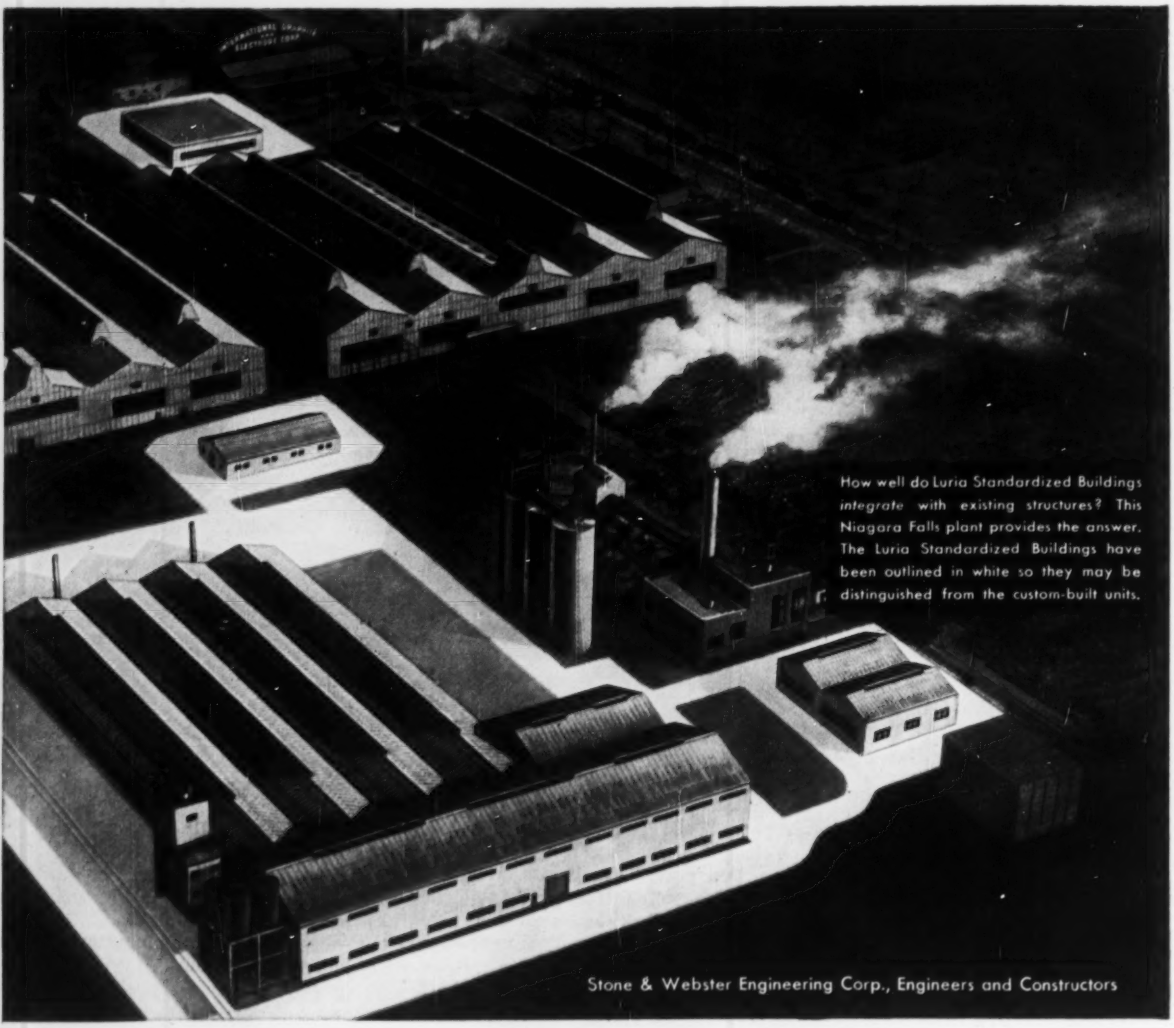
• **La Paz, Bolivia,** continues to be hampered by the lack of foreign exchange to cover the importation of materials for private construction. Hence, private work is down 30% compared with 1955. On the other hand, public construction of pipelines airports, etc., in which American contractors frequently participate, is up 300%. Supplies of local materials are improving, but imported items are increasingly scarce. Labor is plentiful.

• **Lima, Peru,** reports materials in good supply, with no restrictions on imports. There are occasional shortages of steel, but not enough to hamper building. Unskilled labor is plentiful in the cities, but shortages have appeared in the provinces. Occasional shortages of skilled labor crop up in Lima; the provinces report marked shortages. General construction activity is about the same as last year and is expected to continue at the same pace under the newly elected administration.

• **Mexico City, Mexico,** had a better construction year in '56 than in '55 or '54 and looks forward to '57. Subsidiaries of American firms have a good chance to get in on Mexico's future building. Structural steel and concrete are in short supply, though increased quantities are expected to become available. Skilled labor is scarce, but can be had by offering higher wages. On-the-job training is generally conceded to be necessary. Unskilled labor is plentiful.

• **Montevideo, Uruguay,** has grandiose plans for public construction but is handicapped in financing them. This year's public construction will fall below last year. Except for steel and cement, materials are in good supply. A state-

Continued



How well do Luria Standardized Buildings *integrate* with existing structures? This Niagara Falls plant provides the answer. The Luria Standardized Buildings have been outlined in white so they may be distinguished from the custom-built units.

Stone & Webster Engineering Corp., Engineers and Constructors

Why International Graphite and Electrode Division of Speer Carbon Company chooses LURIA Buildings

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Construction materials prices around the world

Construction materials prices in national currency, fob city

Central and South America

	Structural steel per cwt		Reinforcing steel ¾ to 1-in., per cwt		Portland cement per bbl		Lumber, 2x4, S4S, per Mfbm 1st class pine		Lumber, 2x4, S4S, per Mfbm 2nd class pine		Gravel 1½-in., per ton		Sand per ton	
City	6/56	6/55	6/56	6/55	6/56	6/55	6/56	6/55	6/56	6/55	6/56	6/55	6/56	6/55
Bogota, Columbia	1,800.00aA	800.00a	800.00aB	600.00a	92.00aC	80.00a			4.00b	6.00b	15.50c	14.00c	13.50cd	13.00cd
Buenos Aires, Arg.	4,900a	3,550a	3,460a	2,300a	579a	397a	46eD	29eE	43fF	25f	230c	145c	47cg	40cg
Caracas, Venez.	600ah	600ah	600ah	600ah	106ah	110ah	350c	400c	280ci	370ci	16c	14c	18c	15c
Ciudad Trujillo, Dominican Rep.	13.00j	8.75j	9.00j	8.00j	1.45k	1.45k	150l	145l			2.75c	2.50c	2.00c	1.65c
La Paz, Bolivia	......	......	1,000m	260m	3,075n	1,115n	500o	280o	400o	200o	8,500c	4,000c	8,000c	4,000c
Lima, Peru	4.20Gm	3.80Hm	3.00m	2.94m	16.77n	14.45n	4.00p	4.05p	3.80pq	3.50pq	43.00cr	34.00cr	25.00c	25.00c
Mexico City, Mexico	2,200a	1,490a	2,100a	1,490a	230.00s	185.00s	2,000	2,000	1,800	1,800	80.00t	70.00t	75.00u	......
Montevideo, Uru.	......	......	560.00av	480.00	70.00a	70.00a	850w	600w	670x	500x	10.00a	10.00a	2.70a	2.70a
Quito, Ecuador	......	......	170z	170z	28.70k	28.70k			6aa bb	6aa bb	45c	45c	28c	28c
San Salvador, El Sal.	100.00z	95.00z	150.00z	145.00z	4.40cc	4.40cc	4.00dd	3.90dd	2.75dd	2.60dd	20.00a	19.00a	7.00a	7.00a
Santiago, Chile	180,440a	88,130a	87,210a	46,090a	12,800a	7,239a	320,000y	300,000y	400,000yee	400,000yee	1,400cj	700cj	1,400cj	700cj
Sao Paulo, Brazil	20,000a	9,000a	11,000agg	8,000agg	110ffhh	65ff	750ii	500ii	5,000jj	2,300jj	260c	210c	240c	140c

•a per metric ton •b local oak, 20 x 20 cm, per meter •c per cu meter •d washed, rough-washed, five 6/55, 12.00; 6/56, half-washed, 7.80; rock sand 6/55, 7.00; 6/56, 5.75 •e 3" x 4" spruce, per sq meter 1" thick •f 1" x 6" spruce, per sq meter 1" thick •g fine sand—coarse sand 6/55 111, 6/56 135. •h fob mill •i saqui saqui •j delivered to job •k per 42.5 kg sack •l long leaf pine •m per kilo •n per 42 kilos •o per sq ft •p per bd ft •q price of Ternille 6/56 and 6/55 3.40 •r 1"-2 in. 6/56, 41.00; 6/55, 32.00 •s Tolteca •t Blue, per truck load, 3 cu meters •u per 3 cu meters •v theoretical price; item not available •w pine tea •x pine brazil •y per 1,000 boards 1" x 10" x 12' •z per 46 kg •aa eucalyptus •bb per meter •cc per 42 kg bags •dd 12 Spanish ft bds (28 cm/ft) •ee poplar-alamo •ff per 50 kg sack •gg ⅝" to 1" •hh quota, 50 kg sack, 90 •ii per dozen, 3" x 3" x 4.27 meters long •jj beams, Peroba, 6 x 12 cm x 5 meters long

Ranges •A 1,000-1,800 •B 700-800 •C 88-92 •D 45-46 •E 27-29 •F 41-43 •G 3.80-4.20 •H 3.00-3.80

Africa and Middle East

City	6/56	6/55	6/56	6/55	6/56	6/55	6/56	6/55	6/56	6/55	6/56	6/55	6/56	6/55
Baghdad, Iraq	70bA		72bB		7½b		0.730a		0.700a		1½c		0.750c	......
Beirut, Lebanon	0.55d	0.45dC	0.45dC	0.39dD	63.50c	63.50c	235.00ef	235.00ef	190.00eg	190.00eg	7.00e	7.00e	4.00e	4.00e
Cairo, Egypt	90cE	50c	55c	48c	5.50c	5.20c	33	33	28	28	0.75h	0.70h	0.35h	0.35h
Casablanca, Morocco	58,800c	55,050c	53,300ck	49,750ck	6,900ci	6,415ci	27,802el	27,270el	23,683el	25,250el	700ej	700ej	250ej	220ej
Istanbul, Turkey	1,200c	1,000c	2,000cF	1,500cG	120cmH	100cmI	600eo	360eo	460eo	280eo	28enJ	22enK	22enL	20enM
Johannesburg, So. Af.	31/25/–b	34/–/–b	31/5/–b	30/–/–b	–/5/½p	–/5/½p	–/5/–qr	–/4/–qr	–/3/–qs	–/2/5qs	–/12/3t	–/14/–t	–/17/–t	–/16/–t
Jerusalem, Israel	......	......	410c	350c	85c	63.75c	......		215eu	180eu	3.814e	3.565e	1.538e	1.513e
Natal, So. Af. (Durban area)	95/–/–kvn	......	–/39/6w		–/5/10pn	......	–/24/–xaa	......	–/15/6xbb		–/13/–nt	......	–/5/–t	......
Salisbury, So. Rhodesia	95/–/–b		60/–/–b		–/8/4½pcc	......	–/–/13.9dd		–/–/10.35ee		–/30/–bn		–/15/–bn	......
Tangier, Morocco			5.45dff	5.10dff	760cm	740cm	2,100egg	......	2,200egg	......	90c	80c	65c	60c
Tel Aviv, Israel	550chh	420chh	450chh	360chh	84.00c	62.75c	450e	350e	255eii	150eii	4.150e	3.400e	1.800e	1.700e

•a per sq ft •b per short ton •c per metric ton •d per kilogram •e per cu meter •f Swedish fir, any size •g Whitewood, any size •h per 1,000 kilos •i fob mill bulk •j fob quarry •k 12 mm diam •l imported—local cedar 6/56, 19,564; 6/55, 19,000 •m fob mill •n delivered •o fob yard •p per 94-lb bag •q 9" x 3" per running ft •r clear Oregon •s Oregon •t per cu yd •u local equivalent •v heavy steel—light steel, 120 •w 1-in. made locally; ⅜-in. freighted from Transvaal, –/42/6 •x per cu ft •aa clear Oregon; deal, –/17/6 •bb merchantable Oregon; S.A. pine, –/12/6 •cc for quantities, –/7/3 •dd clear Oregon pine, per running foot, 1½" x 4½" •ee merchantable Oregon pine, per running foot, 1½" x 4½" •ff in bulk to wholesaler in port; add 14½% duty crossing into city •gg 2" x 4"—local equivalent, Spanish pine, 6/56, 2,000; 6/55, 2,000 •hh imported •ii European spruce 6/56, 230; 6/55, 185

Ranges: •A 65-70 •B 70-72 •C 0.40-0.45 •D 0.30-0.39 •E 65-90 •F 1,200-2,000 •G 1,000-1,500 •H 10-120 •I 75-100 •J 18-28 •K 15-22 •L 18-22 •M 15-20 •N 80-95.

North America and U. S. Territories

City and Country	6/56	6/55	6/56	6/55	6/56	6/55	6/56	6/55	6/56	6/55	6/56	6/55	6/56	6/55
Anchorage, Alaska	9.00a	8.50a	7.82a	6.55a	8.05b	7.85b	125.00cd	135.00cd	135.00cd	135.00cd	5.00def	5.00def	5.00def	5.00def
Havana, Cuba	12.00		9.00		1.25u	......	155.00	......	155.00		2.80		5.50r	......
Honolulu, Hawaii	7.00g	7.00g	6.75h	6.75h	4.83	4.68	171.00di	154.00di			2.80	2.75	4.00	4.00
Montreal, Canada	8.00j	8.00j	7.50j	6.65j	2.86	2.86	180.00d	155.00d	100.00k	92.00k	1.95	2.20	2.25	2.25
New York, USA	8.21	7.48	7.35m	6.85m	4.00n	3.85n	127.00cn	125.00cn	129.50cdn	127.50cdn	3.05co	2.85	2.00co	1.90
Ottawa, Canada	11.00A	9.00B	11.00A	9.00B	4.84	4.84	265.00	240.00	200.00l	180.00l	2.50e	1.50e	1.85e	1.00e
San Francisco, USA	8.55	7.50	7.55	6.85	3.59	3.39	91.00dp	86.00dp			2.02	2.07	2.12	2.17
San Juan, PR	10.00	9.00	7.00	6.75	1.10q	1.10q	175.00	175.00C	120.00	125.00D	3.65r	3.56r	2.60r	2.44r
Winnipeg, Canada	9.25	9.00	8.35s	7.55s	1.17t	1.17t	100.00k	95.00k	95.00k	90.00k	3.75e	3.75e	3.75e	3.75e

•a fob dock, Seattle •b bulk, fob Anchorage—in paper bags, fob Seattle 6/56, 4.29; 6/55, 4.14 •c delivered to job •d Douglas fir •e per cu yd •f winter price, '56 and '55, 7.00 •g import price; cut of stock from local suppliers, 8.50 •h import price; cut of stock from local suppliers, 8.00 •i Douglas fir, construction grade, mixed with 15 to 20 per cent standard grade •j add dom., prov. & municipal sales taxes •k spruce •l local lumber spruce '56, 125.00 Mfbm; '55, 100.00 •m add 30¢ delivery •n truck lots •o barge lots and. •p mill price, add freight •q per cwt •r per cu. meter •s 1" diam-price for ⅜" diam. 6/56, 8.50; 6/55, 7.85 •t per 87½-lb bag (4 bags = 1 bbl) •u per sack

Ranges •A 9.00-11.00 •B 8.00-9.00 •C 150.00-175.00 •D 118.00-125.00

Europe

City	6/56	6/55	6/56	6/55	6/56	6/55	6/56	6/55	6/56	6/55	6/56	6/55	6/56	6/55
Amsterdam, Nthlds.	513.35a	475.85a	502.50a	487.50a	55.50a	55.50a			229.00bc	249.00bc	7.67a	7.17a	5.32a	5.02a
Athens, Greece d	6.70e	12e	5.40e	9e	610a	600a	2,700e	3,100e	2,500ef	2,800ef	45c	32c	52c	40c
Bonn, W. Germany	441.00a	431.00a	452.00a	441.25a	73.00a	73.00a	250.00c	245.00c	235.00c	225.00c	8.50c	6.00c	10.00c	7.00c
Brussels, Belgium	5,400ag	4,850ag	5,350ag	5,175ag	659ah	659ah	38.06ij	37.50ij	32.50ik	32.00ik	105.00al	87.50al	36.50am	36.50am
Copenhagen, Den.	950.00an	830.00an	950.00an	850.00an	21.55no	19.85no	13.59np	13.59np	13.09np	13.09np	16.50mq	16.50mq	7.75mr	7.75mr
Dublin, Ire.	63/–/–s	48/–/–s	52/10/0s	57/–/–s	6/5/6s	5/10/6s	–/12/10t	–/11/5t	–/14/5½u	–/13/4u	–/12/–v	–/12/–v	–/12/–v	–/12/–v
Geneva, Switzerland	79.00mwxA	52.00mwx	82.50mwxB	60.00wny	5.40ny	5.40ny	260.00cn	250.00cn			10.50cbb	9.00cbb	10.50c cc	11.50c cc
Helsinki, Finland	54e	50e	52e	48e	392y	403y			77.0.0dd		1,150cn	820c	750cn	700c
Lisbon, Portugal	4.50e	4.50e	4.50e	4.50e	1,000c	1,000c	1,400c		900c		75a		75a	
London, England	33/16/6eedv	30/5/–eedv	35/9/–ffdv	3/13/–ffdv	5/–/–v	5/–/–v	130ggC	130ggC	105ggD	105ggD	–/23/–hh	–/21/–hh	–/24/3hh	–/22/3hh
Madrid, Spain	4,775aii	4,775aii	5,214ajj	5,214ajj	456.89a	456.89a	3,050c	2,800c	2,675c	2,540c	45.50c	38.00c	36.00c	24.00c
Oslo, Norway	48.5kkll	45.00kkll	48.5kkll	45.00kkll	120.00a	115.00a	1,340mm	1,340mm	1,280mm	1,270mm	16.00hhE	16.00hhE	11.50hhF	11.50hhF
Paris, France n	70,765a	67,012a	74,542ann	70,589ann	7,815a	7,788a	34,334coo	32,500coo	26,604coo	22,900coo	2,384cpp	2,221cpp	2,132cqq	1,975cqq
Rome, Italy	83de	82de	7,150dx	7,600dx	1,060nx	1,060nx	35,500nc	35,500nc	34,000nc	34,000nc	1,850ncrr	1,900ncrr	970nc	980nc
Stockholm, Sweden	760a	675a	722.50a	657.50a	96.60a	89.60a	2.42aa	2.34aa	1.32aa	1.29aa	12.25cG	11.75cH	11.25cI	10.75cJ
Vienna, Austria n	375.00xK	375.00xK	350.00x	350.00x	480.50a	447.50a	......	......	1,080.00c	1,000.00c	36.00c	36.00c	40.00c	40.00c

•a per metric ton •b 1½" x 4" local equivalent •c per cu meter •d factory, mill, or local shop prices •e per kilogram •f local equivalent 6/56, 1,700 6/55, 2,500 •g add freight from basing point •h by barge •i 2½ x 7" running meter •j Scandinavian •k domestic •l crushed 8/22 in. fob barge on Meuse •m fob quarry •n delivered •o per 4 bags-170 kgs •p per cu ft •q 1500-1600 kgs •r 1500 kgs approx. •s per ton •t imported white deal, per ft •u imported red deal, per ft •v per long ton •w carlots •x per 100 kg •y per 50 kg bag •z plus 6% tax •aa per meter •bb delivered 6/56, 14.50; 6/55, 13.50 •cc delivered 6/56, 15.50; 6/55, 14-15 •dd basic price per std for 7" unsorted redwood f.a.s. S. Finnish port •ee wholesale 6/56 48-4-6; 6/55 45-15-0 •ff wholesale 6/56 38-0-0; 6/55 44-3-0 •gg per 165 cu ft •hh per cu yd •ii black market 6/56 6,750; 6/55 7,500 •jj black market 6/56 40% more; 6/56 50% more •kk wholesale; mill price 6/56, 44; 6/55, 42 •ll per cwt; over 10 metric tons, add 1.35 for 10 and 13 mm; 3.80 for 6 mm. •mm per 4.672 cu meter •nn 2/5 in. diameter •oo 1 x 3 1/5 Vosges •pp 1 in •qq fine; coarse 6/56, 2,182; 6/55, 2,025 •rr 2-3 cm; 5 cm, 6/56, 1,650; 6/55, 1,700

Ranges: •A 71-79 •B 70.50-82.50 •C 110-130 •D 95-105 •E 11.10-16 •F 6.70-11.50 •G 11.25-12.25 •H 10.75-11.75 •I 10.25-11.25 •J 9.75-10.75 •K 350-375

Asia and Australia

City	6/56	6/55	6/56	6/55	6/56	6/55	6/56	6/55	6/56	6/55	6/56	6/55	6/56	6/55
Bangkok, Thailand	4,000a	3,800a	3,300a	3,250a	550a	550a	3,000b	2,900b	950bd	1,000bd	95b	95b	45b	50b
Bombay, India	585/–/–e	500/–/–e	575/–/–e	550/–/–e	102/8/–e	105/–/–e	12/–/–fc	15/–/–cf	8/–/–cf	10/–/–cf	47/–/–gh	40/–/–gh	45/–/–g	36/–/–g
Colombo, Ceylon	800.00e	750.00e	750.00e	700.00e	180.00e	180.00e	24.00fA	24.00fA			16.00e	16.00e	5.00e	5.00e
Karachi, Pakistan	1,600/–/–eB	615/–/–e	1,200/–/–Ce	765/–/–e	110/–/–e	76/–/–e	n.a.	7/8/–f	11/–/–fjD	6/12/–	27/–/–k	18/–/–k	15/–/–k	18/–/–k
Manila, PI.	800aE	700a	410al	500aF	5.80mnG	3.80			275oH	190oI	4.95bJ	5.50bK	4.50bL	5.00bM
Melbourne, Aust.	51/10/–er	45/–/–er	53/–/–es	40/–/–es	11/–/–et	10/8/9et	18/10/6pN	17/–/–pO	9/2/6puP	8/12/6puQ	1/14/9q	1/12/6q	1/14/–q	1/12/–q
Tokyo, Japan	60,000a	40,000a	58,000a	35,000a	7,000a	8,000a	4,000v	4,000v	3,600v	3,500v	7,200w	6,700w	4,800w	4,700w
Wellington, N.Z.	3/5/–R	3/–/3	3/1/–x	3/1/–xT	14/–/–eU	11/18/1e	......	......	3/17/–yz	3/17/–yz	1/5/9q	1/13/4q	1/17/6q	2/–/4q

•a per metric ton •b per cu meter •c Teak •d Teng Rang; Mai Yang 6/56, 630; 6/55, 650 •e per long ton •f per cu ft •g per 100 cu ft •h broken stone •i local equivalent •j Deodar local equivalent, 6/56 7/8/– to 9/8/–; 6/55, 6/4/– •k per 125 cu ft •l ¾" and ⅝" •m per 94-lb bag •n retail •o Red Luan •p per 100 super ft (12" x 12" x 1") •q per cu yd •r imported 6/56, 74/–/– to 80/–/–; 6/55, 68/–/– to 72/–/– •s imported 6/56, 75/–/– to 81/–/–; 6/55, 57/10/– to 63/–/– •t imported 6/56, 14/15/– to 15/17/6; 6/55, 15/–/– to 16/12/6 •u hardwood •v per koku (1' x 1' x 10') •w per ryutsubo (6' x 6' x 6') •x 7/8" round •y per 100 bd ft •z O.B. Remu; untreated Pinus, 6/56, –/81/–; treated Pinus, –/105/– to –/120/–

Ranges: •A 20-24 •B 1,200-1,600 •C 900-1,200 •D 10/8/– to 11/–/– •E 500-700 •F 330-500 •G 5.50-5.80 •H 250-275 •I 170-190 •J 4.50-4.95 •K 4.10-5.50 •L 4.05-4.50 •M 4.50-5.00 •N 13/15/– to 13/10/6 •O 13/17/6 to 17/–/– •P 8/9/– to 9/2/6 •Q 7/19/– to 8/12/6 •R 2/19/– to 3/5/– •T 2/18/– to 3/1/– •U 12/18/– to 14/–/–

Let these Westinghouse men help you cut public works electrical construction costs

Co-ordinating the almost endless details of public works electrical construction is a job for specialists.

Doing it by teamwork can simplify problems, cut costs. It is accomplished by employing specialized know-how on each phase of the specs.

Westinghouse, where ALL types of apparatus for such construction are available in an integrated line, also provides the specialists. Right in your area is a Westinghouse electrical construction engineer who can bring to your problems a team of men tops in their special fields . . . low-voltage distribution, switchgear, motor applications, motor controls, area or interior lighting, ventilation or air conditioning and a host of others.

No job is too small for technical collaboration from your Westinghouse field engineer and his team. No job is too big for them to demonstrate practical savings and technological advantages. Typical applications of Westinghouse apparatus in public works projects are shown below.

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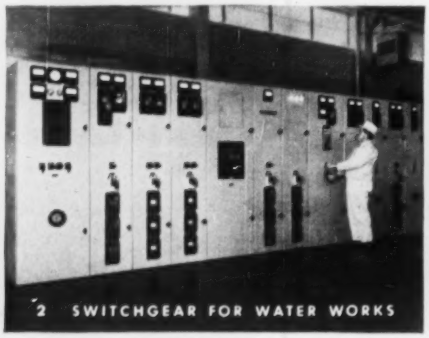
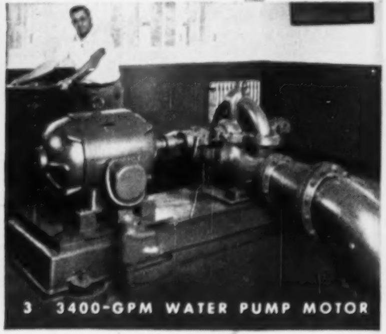
Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.

J-94062-X

1 AIRPORT LIGHTING UNIT



2 SWITCHGEAR FOR WATER WORKS



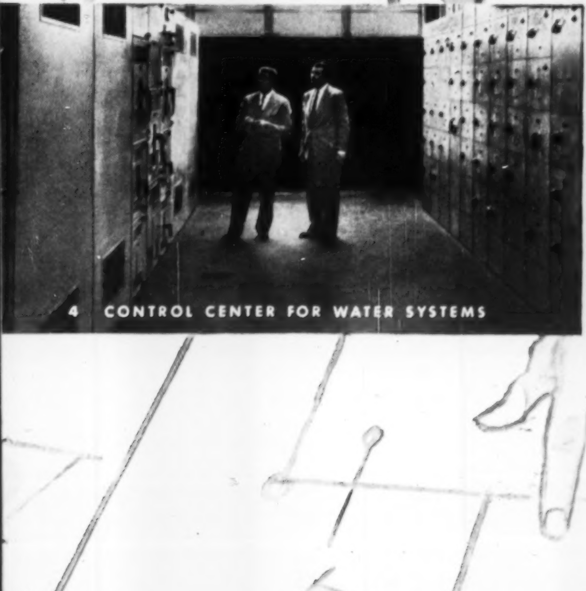
3 3400-GPM WATER PUMP MOTOR

1. Type LD runway and taxiway lights at the St. Louis Airport, typical of the complete line of Westinghouse airport lighting units. **2.** Block-built from unitized assemblies, this metal-clad, high-voltage switchgear vault receives incoming power from the Houston, Texas, Water Works System. **3.** Westinghouse 200-hp, 1800-rpm, drip-proof motor driving a 3400-gpm pump at the Gloucester, Mass., pumping station. **4.** Simplicity, safety, ease of maintenance are featured in this Westinghouse control center and switchgear distributing power for the San Jacinto, Calif., Water System. **5.** 500-hp, Westinghouse compressor motor serving a modern power company building. **6.** Co-ordinated Westinghouse motor control for the compressor motor shown in illustration 5.

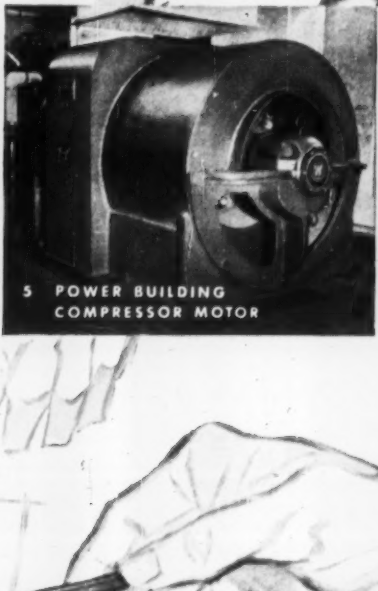
WATCH WESTINGHOUSE!

*WHERE **BIG** THINGS ARE HAPPENING **TODAY!***

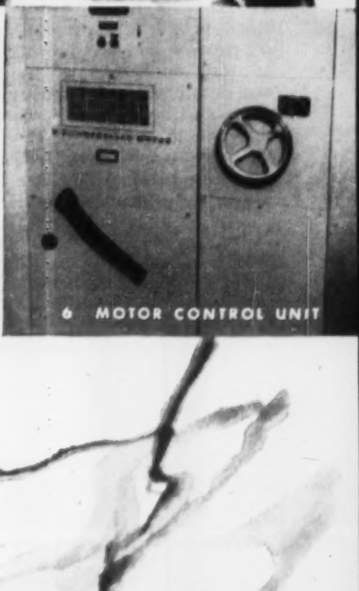
STREET LIGHTING
WATER WORKS
TUNNELS, BRIDGES, DAMS
HIGHWAYS, INTERCHANGES
SEWAGE PLANTS
AUDITORIUMS
AIRPORTS



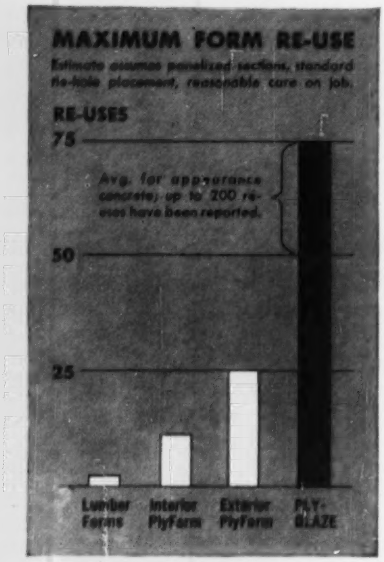
4 CONTROL CENTER FOR WATER SYSTEMS



5 POWER BUILDING COMPRESSOR MOTOR



6 MOTOR CONTROL UNIT



50 to 75 is a good average, but with care you can get up to...

200 RE-USES with PLYGLAZE®

CONCRETE FORM PANELS

PLYGLAZE's tough, hard surface stands up indefinitely under repeated concrete pourings. PlyGlaze forms are worn out only when the panels are cut into unserviceably small pieces. With proper design and care you should get 50 to 75 re-uses. Actually, *over* 200 have been obtained—even then PlyGlaze continues to form good-looking concrete.

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• • • Construction cost trends around the world

controlled cement plant is under construction. Skilled labor is scarce; unskilled, plentiful.

• **San Salvador, El Salvador,** is actively expanding construction both within the city and on the outskirts. Private and public housing developments abound. Materials and unskilled labor are in good supply. Only 6% of construction workers are skilled.

• **Santiago, Chile,** has an adequate supply of major building materials. Deliveries on tiles are slow. Skilled labor is scarce; unskilled, plentiful. General construction activity is on the par with last year. Costs are up sharply.

• **Sao Paulo, Brazil,** reports increasing activity in the construction of industrial buildings, hydroelectric and harbor projects, but some slowing down in apartment buildings, roads, and other public undertakings. An increase in minimum wages is expected to boost material prices by 20% to 30%. Materials are in fairly adequate supply, except for cement and steel. Contractors are virtually obliged to obtain quotas from cement and steel mills to ensure supplies and stable prices. Unskilled labor is plentiful; skilled labor is subject to fluctuating demand.

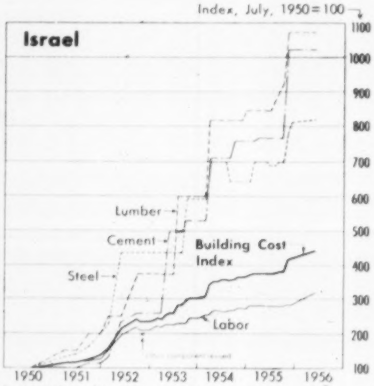
Africa and Middle East

• **Beirut, Lebanon,** reports construction activity is running 20% behind last year's phenomenal rate, despite the start on reconstruction of earthquake-damaged housing. Construction costs are estimated at L£100 to L£50 per square meter for office buildings; L£40 to L£100 per square meter for warehouses.

• **Cairo, Egypt,** was experiencing a building boom before the start of recent hostilities. Public construction was double the 1954 rate. Cement is the only building material running short, despite imports. A new cement plant south of Cairo will ease the situation in 1957. Labor is plentiful.

• **Casablanca, Morocco,** reports construction activity running 20% under last year as a result of unsettled political conditions and the flight of capital. Local materials are plentiful and so is the labor supply, with the exception of skilled classifications.

• **Istanbul, Turkey,** reports brisk construction activity despite substantial shortages of steel. Prices of imported cement and steel are triple those of local supplies. Government projects; however, are supplied with all needed materials at rates far below market prices. Yet new hotels and office buildings are under construction, generally by well-equipped foreign firms. American firms participate in the larger public projects as either consultants or contractors.



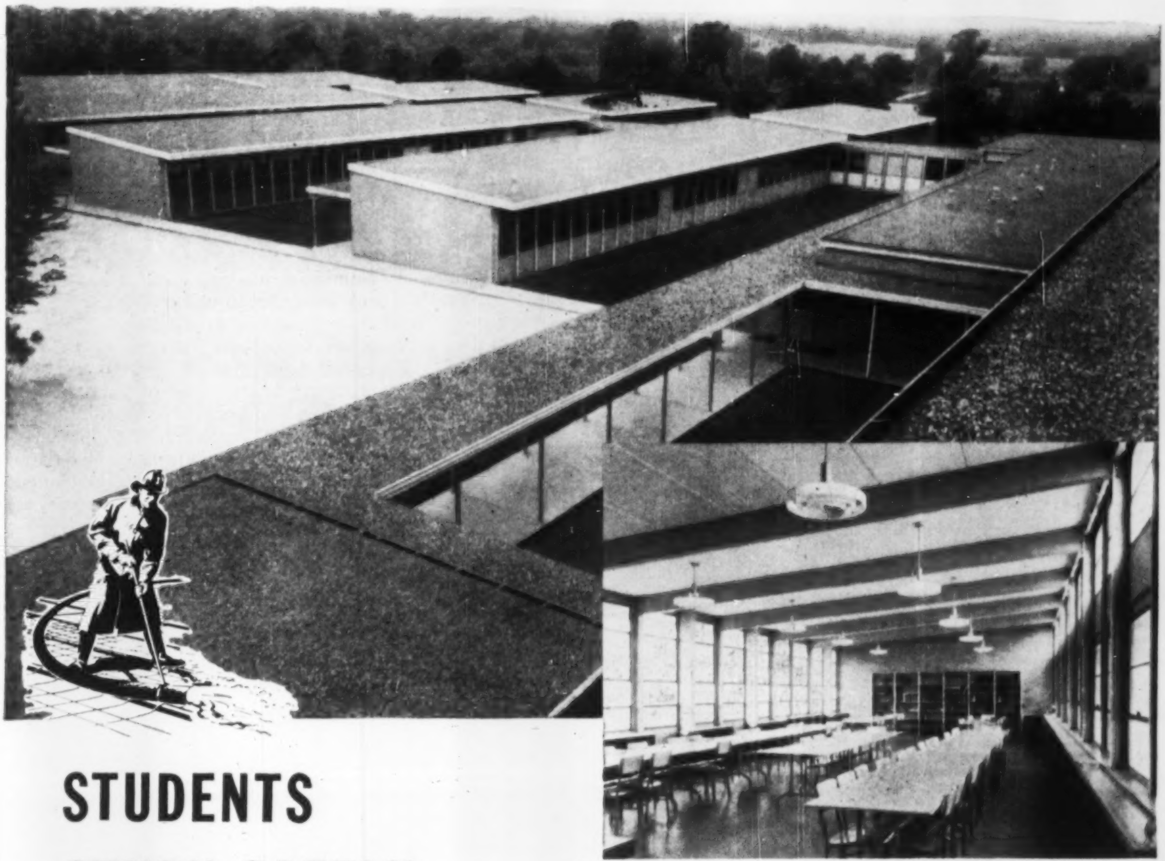
• **Jerusalem, Israel,** continues to build housing to shelter the steady influx of immigrants through the 1956 pace is below the peak years, 1951-52. More cement is becoming available from the recently completed Shimshon plant. The supply of other building materials, particularly reinforcing bars, is improving as a result of imports under the German reparations program. Skilled labor is becoming more available as a result of on-the-job training and public training courses.

• **Johannesburg, South Africa,** reports a slump in construction activity as a result of credit restrictions, high interest rates, and the fact that major developments in gold and uranium mining have been completed. The housing backlog has also been almost completely eliminated. Consequently both labor and materials are more plentiful than last year.

• **Natal, South Africa,** also is feeling some curtailment of construction this year as result of credit restrictions. Small builders and home builders have been most affected. Large contractors continue busy. Labor and materials are plentiful.

• **Salisbury, South Rhodesia,** is having an active construction year. Material supplies are "fair." Unskilled labor (native Africans) is plentiful and cheap. Skilled labor (imported from the United Kingdom or South Africa) is scarce.

Continued



Daingerfield School, Daingerfield, Texas; *Architect:* Stanley Brown, A.I.A., Dallas, Texas; *General Contractor:* Vaughn Bros. Construction Co., Naples, Texas; *Roof Deck Contractor:* Lydick Roofing Co., Ft. Worth, Texas

STUDENTS STUDY SAFELY...

UNDER GOLD BOND "FIREFIGHTER" ROOF DECK

When the Daingerfield, Texas, School District built its new Junior and Senior High School, they built well—and safely.

Here's the new building, a $643,705.90 project serving 700 pupils in an area of 109.41 square miles. They kept costs low here—with no sacrifice of fire safety—by using Gold Bond "Firefighter" Gypsum Roof Deck poured over Gold Bond Econacoustic Formboard and Gold Bond Gypsum Formboard.

The Daingerfield job used 89,347 square feet of Formboard and 356 tons of Metro Mix "Firefighter" Roof Deck to build a combination exterior roof and interior ceiling that sound conditions, insulates and reflects light throughout the school—and protects against fire spread, too! Incombustible gypsum can't transmit high temperatures or warp when exposed to hot flame.

As much as 30,000 square feet of "Firefighter" Roof Deck can be poured in one day! Quick setting action lets workmen walk on deck within 15 minutes...allows deck to take full load capacity in less than one hour! Low dead load permits lighter supporting structures—saves in construction costs. Adaptable to pitched, barreled or flat roof design. For complete details on safe, economical "Firefighter" Roof Decks, mail this coupon today. National Gypsum Company, Buffalo 2, N.Y.

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GYPSUM ROOF DECK

NATIONAL GYPSUM COMPANY

NATIONAL GYPSUM COMPANY, Dept. EN-126

Gentlemen: Send me Technical Bulletin No. 589 with complete details on "Firefighter" Roof Decks.

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- **"...in 15 or 20 minutes** we complete a gas or water house connection with one of our Clevelands."
- **"...1800 to 2000 feet of 30" deep trench per day...** our average production on building footings with a Cleveland."

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- **"...CLEVELANDS operate a working week on a tank of fuel."**
- **"...all-around adaptability...** just one of the many reasons why we prefer Clevelands . . . besides utilities work and footings, we use them for drainage trenching, septic tank installations and a wide range of other applications."
- **"...our CLEVELAND 140 paid for itself within 30 days."**
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Cleveland users everywhere report similar satisfactory experience . . . it's typical of the performance you can depend upon with Clevelands.

THE CLEVELAND TRENCHER CO.

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Good Everywhere

Cost trends around the world

• **Tangier, Morocco,** reports new construction in a slump as a result of the uncertainty attending the new political state. Foreign capital is pulling out, though no restrictive legislation has been enacted. Consequently labor is in good supply. Local materials are plentiful (cement, sand, gravel), but imported items (lumber, steel, tiles, plumbing, marble, glass) are available only on order from Europe.

• **Tel Aviv, Israel,** reports construction activity above both 1954 and 1955 following resumption of immigration, though private projects are being hit by government credit restrictions. Unskilled labor is plentiful. Skilled labor is easier as a result of government training projects. Local materials are in good supply; steel and iron is coming from Germany under reparations agreements.

No. America-U. S. Territories

• **Anchorage, Alaska,** continues to have a good supply of construction materials, except for steel. Prices of major construction materials have remained stable except for steel and cement, which have risen as follows: structural steel, +6%; reinforcing steel, +19%, cement, +3%. Both skilled and unskilled labor remain plentiful, with wage rates continuing unchanged from the level that was reached in mid-1955. Construction activity in 1956 has been running below last year.

• **Havana, Cuba,** reports plentiful supplies of both construction materials and labor. In fact, there is a current surplus of labor as activity lags behind last year. However, American Foreign Power, parent company of Compania Cubana de Electricidad, proposes to spend $147 million in Cuba over the next five years in a vast expansion program designed to double the company's output. Included in the program is an atomic power plant within the next three or four years plus nine new units to the company's present generating plant.

• **Honolulu, Hawaii,** looks for a step-up in construction activity late in 1956 and early in 1957 as a large military housing program gets under way. Labor, both skilled and unskilled, has been in good supply this year, but shortages may develop when the big housing project starts. Materials on hand are adequate for small jobs, but contractors who are handling big jobs now are allowing 90-120 days for supplies from the coast as compared with 30-45 days in years past.

Continued

BRING ON YOUR RIVERS!

CLOW RIVER-CROSSING CAST IRON PIPE TAKES 'EM "IN STRIDE"!

EASY TO LAY. As easy to make up as a standard flanged joint. Lower labor installation cost because of ease of joint make-up and longer laying lengths.

ONLY A RATCHET WRENCH NEEDED. No split parts. Fewer parts—each joint consisting of one complete pipe, one solid follower ring, one solid ring gasket, bolts and nuts.

FULL 15° TURNING DEFLECTION with absolutely no reduction in the full internal opening area—therefore, no abnormal pressure-drops at deflected joints. Deflection stresses evenly distributed among all the bolts.

LONGER LAYING LENGTHS—approximately 18'6"—faster installation, lower costs. However, lengths may be varied to suit conditions. For example: 6 foot, 12 foot or other special lengths may be advisable to suit required curvature.

Mail coupon for complete information on Clow Ball-and-Socket River-Crossing Pipe. No obligation, naturally.

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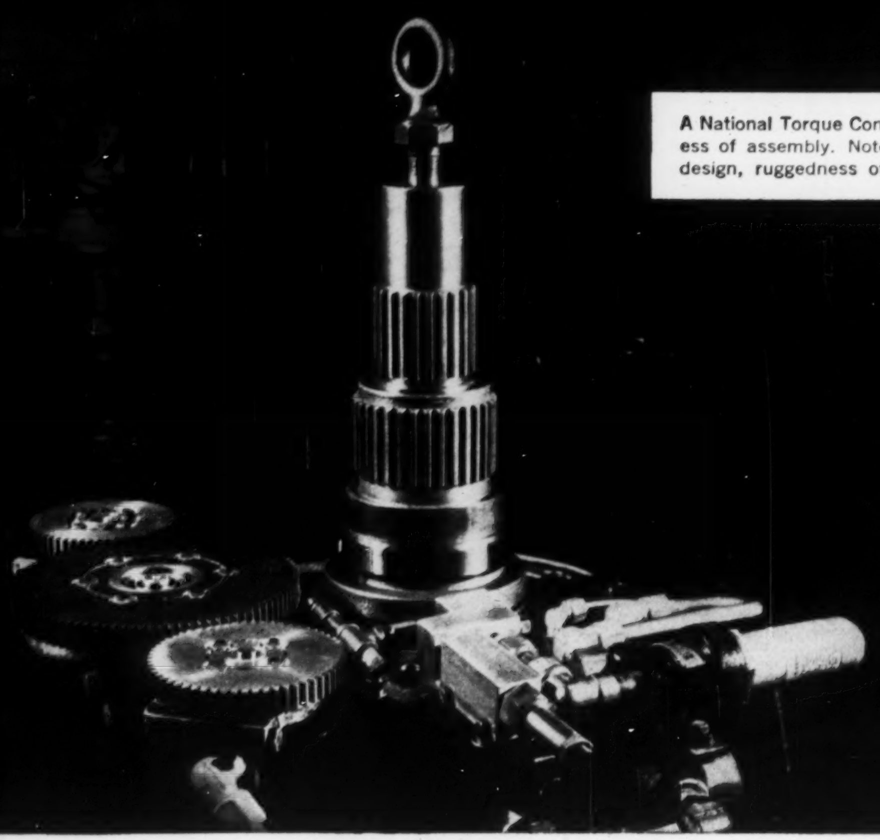
Individual's Name ____________________
Position ____________________



A National Torque Converter in process of assembly. Note simplicity of design, ruggedness of construction.

National Torque Converters are designed and built to fit your requirements

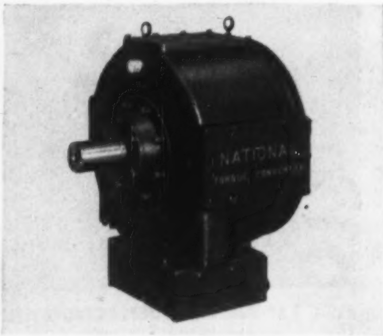
The simple, rugged design of National Torque Converters gives you many outstanding features such as these:

Easy installation of torque converter. Long equipment service life. Minimum maintenance of equipment and torque converter, even in toughest industrial service.

With a National Torque Converter, the engine or motor attains optimum speed quickly . . . delivers full horsepower to the job smoothly and continuously. Your equipment will do more work per unit per operator per day.

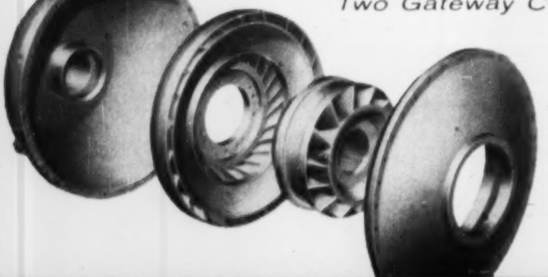
You have a choice of 6 basic hydraulic circuit sizes, each with a range of input ratings, permitting exact matching of torque converter to gasoline or diesel engines or electric motors of 100 to 1000 horsepower.

National engineers will gladly work with your designers to find the correct size and capacity of National Torque Converter for the specific power–speed characteristics of your equipment. Why not call on them, and get the benefit of their experience? Write The National Supply Company, Two Gateway Center, Pittsburgh 22, Pa. Ask for a copy of Bulletin No. 468.



THE NATIONAL SUPPLY COMPANY

INDUSTRIAL PRODUCTS DIVISION
Two Gateway Center, Pittsburgh 22, Pa.



Pace-setters in the progress of industrial power transmission

. . . Construction cost trends around the world

Canadian Building Trades Wage Rates July 1, 1956

Dominion Department of Labour, and Canadian Construction Association

	Bricklayers				Carpenters				Electricians				Painters			
City	1939J	1945J	1955	1956	1939J	1945J	1955	1956	1939J	1945J	1955	1956	1939J	1945J	1955	1956
Halifax*a*	$1.00	$1.15	$1.94	$1.94*f*	$0.70	$0.95	$1.69	$1.69*f*	$0.85	$1.06	$1.79	$1.79*f*	$0.60	$0.81	$1.45	$1.45*f*
Saint John	0.90	1.10	1.85	1.85	0.50-0.60	0.81	1.55	1.58	0.50-0.65	0.85	1.57	1.63	0.50-0.55	0.76	1.40	1.47
Quebec	0.75-0.85	1.00	1.80	1.80	0.55-0.60	0.80	1.60	1.60	0.55-0.65	0.80	1.60	1.70	0.50-0.55	0.75	1.50	1.50
Montreal	0.80-0.90	1.06	2.00*e*	2.10	0.70	0.96	1.80*e*	1.90	0.75	1.01	2.00	2.00	0.66	0.86	1.70	1.80
Toronto	1.00	1.23	2.46	2.61*i*	0.90	1.11	2.30	2.40*j*	1.00	1.21	2.50	2.65	0.75	0.97	1.95	2.05
Hamilton	0.90	1.19	2.35	2.40	0.75	1.04	2.15	2.20	0.75	1.05	2.25	2.40	0.65	0.86	1.65	1.75
Windsor	1.15	1.26	2.45	2.45	0.95	1.18	2.22	2.22	1.15	1.26	2.35	2.35*f*	0.60-0.65	0.95	1.80-1.90	1.90
Winnipeg	1.10	1.25	2.25	2.25	0.85	1.05	2.05	2.05	0.85	1.05	2.05*b*	2.20	0.70	0.90	1.65	1.70-1.80
Saskatoon	1.00	1.20	2.23	2.29	0.50-0.75	0.96	1.90	1.95	0.70-0.80	0.93	2.00	2.05	0.50-0.70	0.70	1.76	1.75
Edmonton	1.10	1.31	2.30	2.40	0.90	1.03	2.00	2.00	0.85	1.06	2.25	2.35	0.80	0.91	1.65	1.80
Vancouver	1.10	1.29	2.40	2.40*d*	0.75-0.90	1.12	2.22	2.25	0.75-1.00	1.19	2.42	2.42*d*	0.63-0.80	0.97	2.16	2.19

	Plasterers				Plumbers				Sheetmetal Workers				Labourers			
City	1939J	1945J	1955	1956	1939J	1945J	1955	1956	1939J	1945J	1955	1956	1939J	1945J	1955	1956
Halifax*a*	$0.80	$0.95	$1.83	$1.83*f*	$0.85	$1.025	$1.78	$1.78*f*	$0.70	$0.85	$1.55	$1.55*f*	0.30-0.40	$0.52	$1.18	$1.18*f*
Saint John	0.90	1.10	1.85	1,85	0.60-0.70	0.88	1.60	1.70	0.50-0.65	0.81	1.50	1.50	0.30-0.40	0.53	0.75	0.80
Quebec	0.75	1.00	1.80	1.80	0.55-0.65	0.80	1.60	1.70	0.55-0.65	0.80	1.60	1.60	0.40	0.60	1.20	1.20
Montreal	0.80	1.06	2.05*g*	2.12	0.75	1.01	2.10*g*	2.12	0.65-0.75	0.96	1.80*e*	1.90	0.40	0.61	1.25	1.30
Toronto	0.90	1.21	2.40*h*	2.45	1.00	1.17	2.35	2.44	0.93	1.18	2.35	2.40	0.35-0.50	0.67	1.30*c*	1.45*m*
Hamilton	0.90	1.07	2.30	2.40	0.85	1.07	2.30	2.35*k*	0.75	1.04	2.30	2.35	0.35-0.45	0.65	1.15	1.25
Windsor	0.90	1.15	2.10	2.20	1.00	1.25	2.35	2.35*d*	0.70-0.85	1.06	2.25	2.25	0.55	0.75	1.66	1.66
Winnipeg	1.10	1.25	2.25	2.25	0.95	1.15	2.15	2.25	0.70	0.85	1.90	1.95*l*	0.40-0.45	0.63	1.10	1.20
Saskatoon	0.75-1.00	1.06	1.80-2.20	2.20	1.00	1.06	2.10	2.15	0.75-0.90	0.81-0.85	1.80	1.85	0.30-0.40	0.58	1.33	1.38
Edmonton	1.05	1.31	2.225	2.30	1.05	1.16	2.25	2.35	0.96	1.07	2.15	2.25	0.40-0.50	0.61	1.35	1.35
Vancouver	1.00	1.10	2.35	2.35	1.00	1.19	2.35	2.35*d*	1.00	1.18	2.30	2.35	0.45-0.50	0.71	1.60	1.66

Hourly allowance in lieu of vacation pay are not included. Allowances for above trades are: Halifax, 3¢ for all skills except 4¢ for carpenters & electricians and none for labourers; St. John, 2%; Quebec, 2%; Montreal, 2%; Toronto, 4%; Hamilton, 4% except 2% for painters; Windsor, 4%; Winnipeg, 4% except 2% for electricians; Saskatoon, 4%; Edmonton 4%; Vancouver, 2% except 4% for carpenters, plumbers & sheet metal workers •J Rates as of June 1

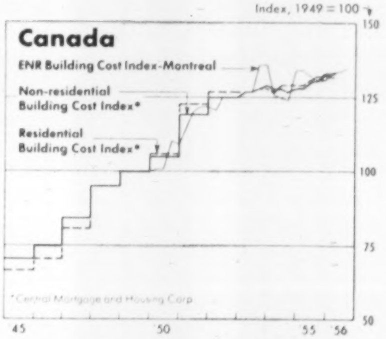
•*a* 1939 & 1945 rates include allowance in lieu of vacation pay •*b* $2.10, 9/1/55 •*c* $1.35, 10/1/55 •*d* negotiating •*e* decision pending on arbitration board award •*f* in conciliation •*g* $2.12, 10/1/55 •*h* $2.46, 8/1/55 •*i* $2.66, 11/1/56 •*j* $2.45, 11/1/56 •*k* $2.40, 11/1/56 •*l* $2.00, 11/1/56 •*m* $1.50, 11/1/56

Canada Construction Cost Indexes—1949 = 100

Central Mortgage and Housing Corp.

Non-Residential				Residential			
'39	57.9	'48	95.3	'39	48.1	'48	95.0
'40	60.0	'49	100.0	'40	51.2	'49	100.0
'41	63.9	'50	105.1*	'41	56.0	'50	106.0*
'42	67.2	'51	118.8*	'42	60.0	'51	123.1*
'43	69.5	'52	125.4	'43	63.7	'52	126.6*
'44	70.5	'53	128.9*	'44	66.4	'53	128.9*
'45	71.1	'54	128.6*	'45	67.2	'54	129.0*
'46	75.0	'55Aug	131.8	'46	70.4	'55Aug	132.5
'47	84.3	'55	131.0	'47	80.9	'55	132.1
		'56Aug	136.4			'56Aug	136.7

Weighted indexes of wholesale prices and wage rates. Intangibles, productivity, etc., not included. * Revised



Canadian Wage and Cost of Living Changes—1945–'55

Unweighted average wage rate increases for 8 principal construction occupations (including vacation pay allowances)

	Per cent increase in wage rates				in cost of living			
City	'46-'56*	'53-'54	'54-'55	'55-'56	'46-'56*	'53-'54	'54-'55	'55-'56*
Halifax	72.4	1.8	7.0	0.0	42.2	0.1	0.8*a*	0.8
St. John	74.5	0.3	3.6	3.0	49.1	6.3	0.9	0.8
Montreal	89.7	5.0	1.6	3.8	49.5	−0.1	−0.4*a*	1.2
Ottawa	91.5	4.8	4.0	4.7	50.8	1.0	0.5	1.5
Toronto	100.4	4.1	2.6*a*	5.1	50.7	1.4	−0.1*a*	1.4
Winnipeg	90.6	0.0	7.9	4.0	47.6	0.3	0.0*a*	1.0
Regina	99.3	3.2	1.2	2.3	47.1*b*	0.2*b*	0.2	0.8*b*
Saskatoon	102.1	3.6	2.5	4.0	47.1*b*	0.2*b*	0.2	0.8*b*
Calgary	92.8	2.7	2.2	3.0	44.7*c*	0.1*c*	−0.6	0.7*c*
Edmonton	92.2	4.2	1.4	3.8	44.7*c*	0.1*c*	−0.6*a*	0.7*c*
Vancouver	86.4	2.3	1.2*a*	0.8	52.4	0.3	−0.4	1.6
Average, 11 cities	90.2	2.9	3.2*a*	3.1	47.8	0.4	0.0*a*	0.7

*10/'46 to 7/'56; other per cent changes, July 1 to July 1 except cost of living for 1956, which is June 1, 1956 •*a* revised •*b* Saskatoon-Regina index •*c* Edmonton-Calgary index

• **Montreal, Canada,** area is booming this year, in part due to the St. Lawrence Seaway and the iron ore projects in eastern Quebec. Labor is very scarce, despite large-scale immigration. Unskilled labor often being used in place of skilled. Except for structural steel, materials are generally adequate. Brick deliveries have been slow, however, and temporary shortages have developed in building board and cement from time to time in different localities.

• **Ottawa, Canada,** also reports all builders fully engaged this year with both residential and non-residential construction. Some governmental projects are being held in abeyance to ease the strain on available labor and materials. Steel shortages have forced postponement of other projects. Dominion Bridge Co., principal local supplier, is taking new steel orders only on six to nine months delivery commitment. Other materials are adequate. Labor is generally plentiful, though there are few skilled men out of jobs, and shortages are anticipated.

• **Winnipeg, Canada,** is caught in a steel squeeze just as the trans-Canada gas pipeline gets under way. Structural steel is acutely short, and deliveries on cement and glass have been slow. The billion-dollar pipeline is draining skilled labor from the area. Pipe fitters and welders are expected to be very scarce. Credit scarcity is slowing down residential building.

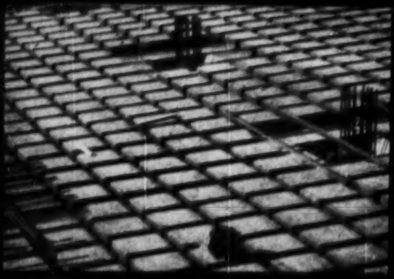
• **San Juan, Puerto Rico,** reports unusual construction in the year ending June, 1956, reaching an all-time high of $143 million for work put in place. This is 10% greater than the preceding fiscal year and stems chiefly from a boom in private residential building. Unskilled labor is plentiful, but skilled labor is becoming increasingly scarce as workers emigrate to the U.S. Periodic shortages of special structural items occur, but not to the extent that builders are handicapped seriously.

Europe

• **Amsterdam, Netherlands,** reports materials in adequate supply in recent months, in part due to increased output and in part to reduced demand following restrictions on the construction of certain types of buildings. There is a shortage of masons, carpenters, plasterers, concrete carpenters and concrete plaiters, and plumbers. Construction activity is slightly above the 1954 level. New housing plans are double those of four years ago.

Continued

Simple open wood centering supports Ceco-Meyer Flange-Type Steelforms for waffle construction used in The Center, Omaha. Here a worker is readying steelforms to fill out a panel.



Waffle concrete-joist construction is an ideal solution for buildings with wide column spacings and light floor loads. Savings are made in the formwork and in the elimination of ineffective concrete.

There's nothing better than reinforced concrete for permanence. With Ceco's Waffle Construction you can have permanence—plus longer spans and higher beam-free ceilings without increasing over-all building height.

Ceco Open-Web Steel Joists used as roof purlins, as illustrated here, comprise the lightest of all standard roof framing, allowing long spans and light beams, columns and footings. They can be erected summer or winter—and are non-combustible and non-shrinking.

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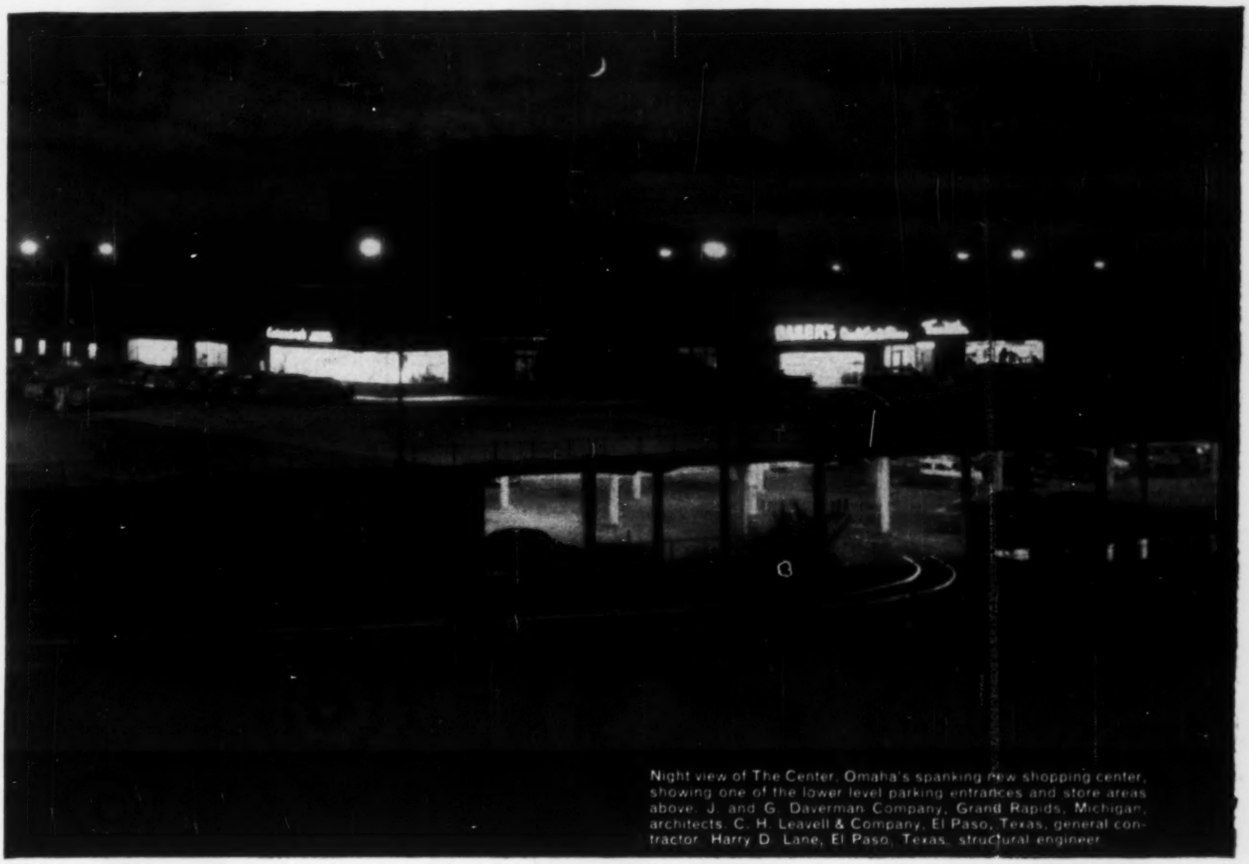

Night view of The Center, Omaha's spanking new shopping center, showing one of the lower level parking entrances and store areas above. J. and G. Daverman Company, Grand Rapids, Michigan, architects. C. H. Leavell & Company, El Paso, Texas, general contractor. Harry D. Lane, El Paso, Texas, structural engineer

CONCRETE JOIST CONSTRUCTION "WIDE OPEN SPACES" ... CUTS COSTS 7%

CECO ENGINEERING TAKES "LAZY" CONCRETE OUT OF LONG SPANS... Wide open spaces ... that's the need in shopping centers ... where the fewer the columns the more freely the merchandise moves. So in designing The Center—Omaha's newest shopping community—the architects J. and G. Daverman Company used Ceco-Meyer Steelform "Waffle" Construction to obtain long, rigid floor spans at reasonable cost. Comparison with other framing methods showed dollar savings of 7%. Non-working "lazy" concrete was eliminated by the open waffle areas—yet this two-way joist system created maximum stiffness. Further savings were made by using Ceco Open-Web Steel Joists for the roof and mezzanine. Ceco also supplied Steel Reinforcing Bars and Welded Wire Fabric, meeting exacting delivery schedules. Here's an example of how Ceco Coordinated-Engineering assures the best structure while saving money and speeding construction. Next time call Ceco for planning help.

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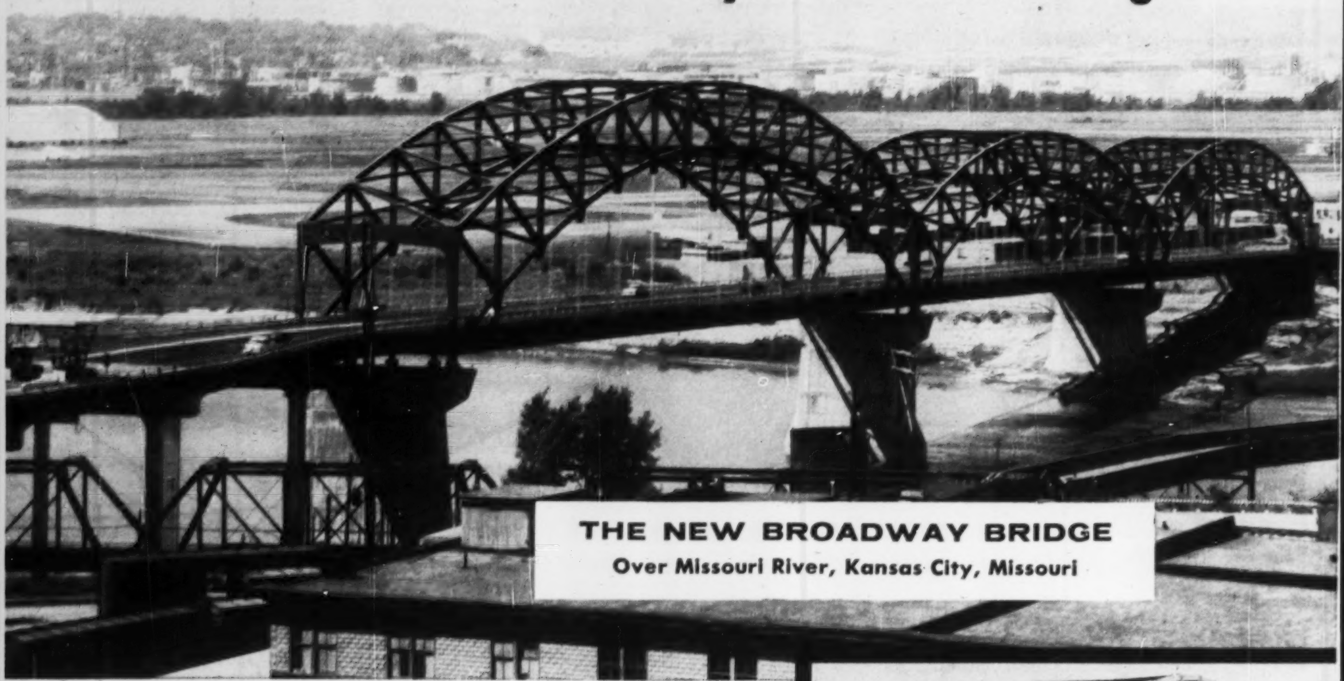
Another Important Highway Bridge fabricated and erected by American Bridge



THE NEW BROADWAY BRIDGE
Over Missouri River, Kansas City, Missouri

THIS HANDSOME NEW 4-lane bridge replaces the highway services of the adjacent Hannibal Bridge (built in 1917), which carried the highway on its upper deck, and will continue to carry the tracks of the Chicago, Burlington & Quincy Railroad on its lower deck.

The structure consists of three Thru Tied Arch Truss Spans, one 540′ long and two of 450′; a South Approach which is made up of two Thru Plate Girder Spans, each 113′ long, and nine Deck Plate Girder Spans, ranging in length from 90′ to 125′-6″; and a 1161′-long North Approach composed of 20 continuous Beam Spans.

All of the 7,277 tons of structural steel for this new bridge was fabricated by American Bridge. In addition, American Bridge erected the three river spans. Field connections were riveted, bolted and welded.

The Broadway Bridge in Kansas City is the most recent of the hundreds of highway bridges built by American Bridge. You'll find them in every state . . . on practically every important highway. In over fifty years of building bridges of every type and size, American Bridge has accumulated a vast and valuable experience in this highly specialized field of construction. If you would like to know more about our ability, skilled personnel, and fabricating and erecting facilities, just call our nearest Contracting Office.

All designs by: Howard, Needles, Tammen & Bergendoff, Consulting Engineers, Kansas City, Mo.

Owned by Municipality of Kansas City, Mo. (Who handled all planning, programming and financing independent of state or federal aid.)

Contractor for three river spans: American Bridge Division.

Contractor for South Approach: Guy H. James Construction Co. and Foster-Smetana Co.

Erection of South Approach sublet by American Bridge to: John F. Beasley Construction Company.

Contractor for North Approach: L. G. Barcus & Son Construction Company.

INTERESTING MOTION PICTURES AVAILABLE—"Building for the Nations" and "The Suspension Bridge," two entertaining and educational films, are now available without charge to business, fraternal and civic organizations, churches, schools and colleges. Write to Pittsburgh office for bookings.

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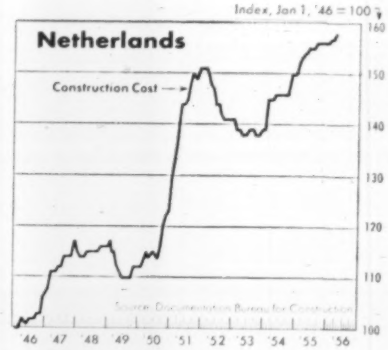
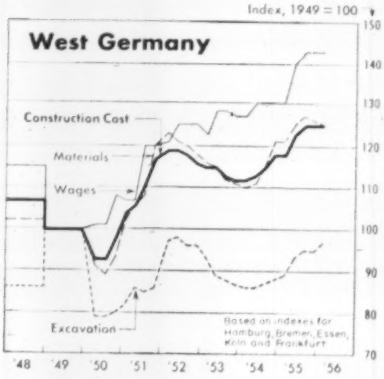
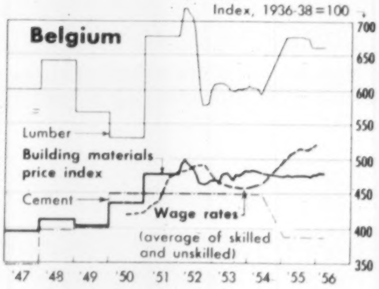
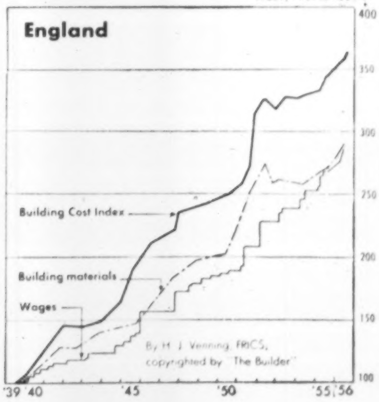
UNITED STATES STEEL

. . . Construction cost trends around the world







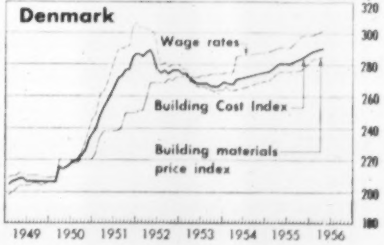


• Athens, Greece, continues to replace the building losses incurred by World War II, earthquakes, and guerilla warfare. Last year's private construction was nearly double that of 1950. Both construction materials and labor are plentiful.

• Bonn, West Germany, expects construction this year to hit DM 26 billion compared with DM 22 billion in 1955, an 18% increase. Skilled labor is scarce. Many firms retained working forces intact during the winter months to ensure their availability in the peak summer months. There is no shortage of construction materials, but all prices, except cement, pushed upward this year.

• Brussels, Belgium, is getting ready for the 1958 World Fair. By 1957, the pressure for labor is expected to get really acute. Imports of 40,000 laborers from Italy are contemplated. At the moment, mobile worker teams from Holland and Germany are taking advantage of the high Belgium building prices. The Germans concentrate on plumbing and frame-fitting contracts; the Dutch go for house-building contracts. Construction material supplies are satisfactory, but there is considerable grumbling about high steel prices and high Scandinavian lumber prices, particularly since lumber stocks are large.

• Copenhagen, Denmark, reports that summer activity in the construction trades has absorbed all available labor. However, current activity is chiefly the result of inactivity during the winter months and during the recent strike. Hence, the high level of recent months is not expected to continue. There are ample supplies of steel, lumber, and gravel. Portland cement is so abundant that the excess is exported. Only 20% of steel needs are supplied locally.



• Dublin, Ireland, has suffered a slump in construction activity since June 1955 as a result of credit restriction. Councils of both Dublin and Cork were refused loans, and housing plans were either revamped or scrapped. Unemployment in the building trades is considerable, and many skilled workers have emigrated. Outside of two large drainage projects, there is little heavy construction in Dublin. Most materials have to be imported, but are available in good supply.

• Geneva, Switzerland, is engaged on colossal dam-building projects in the Alps, which are taxing the country's cement facilities, despite expansions made during the year. Home builders are consequently delayed sometimes by failure to receive their cement needs. Skilled and unskilled workers continue in short supply, with hundreds of thousands of workers being imported from Italy. About 60% of the construction industry's employees are Italians.

• Helsinki, Finland, is under inflationary pressures. Costs are rising. Materials are in good supply. Unskilled labor is plentiful. Periodic shortages crop up for special types of skilled workers. Construction activity in '56 is about the same as last year.

• Lisbon, Portugal, has an ample supply of all traditional local construction materials. There are occasional shortages of such imported items as formica and other specialties. Construction activity is booming. Skilled labor is scarce; unskilled, plentiful.

• London, England, reports a serious shortage of steel products and labor, both skilled and unskilled. Other construction materials are in reasonable balance. Construction activity is on a par with last year.

• Madrid, Spain, continues to have a cement shortage, but less severe than in 1955. Structural steel and wood are also in short supply. Skilled labor, especially structural iron workers, is scarce, but unskilled labor is in good supply. Construction activity this year is running ahead of 1955.

• Oslo, Norway, expects higher interest rates and new taxes on building activity to cut down on the construction pace, particularly outside of Oslo. Steel prices are subject to sudden changes. Labor costs are up substantially for both skilled and unskilled trades.

Continued

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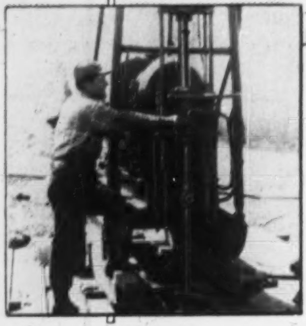

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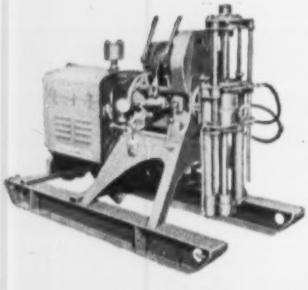

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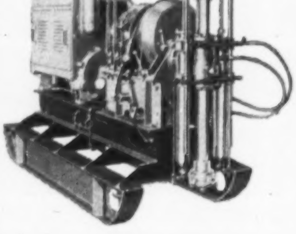

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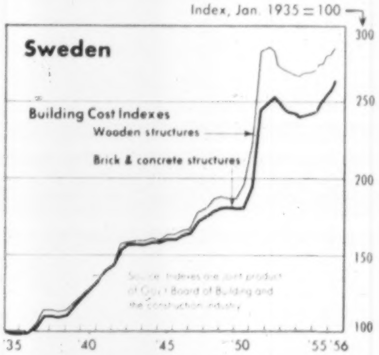
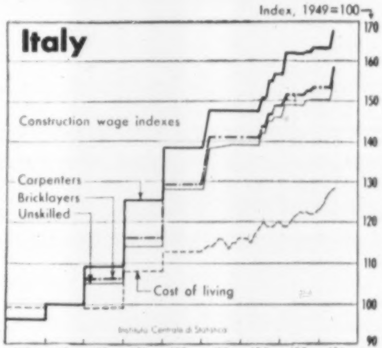
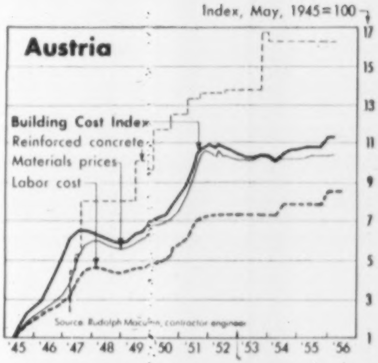






• **Paris, France,** is handicapped by the shortage of skilled labor, created by drafting of men for the Algerian front and the return of Algerian construction laborers to their native country. Materials are in good supply except for bricks and tiles. Prices are very high. Labor costs were upped in April by a law requiring three weeks vacation instead of two.

• **Rome, Italy,** reports the usual seasonal rise in material prices failed to materialize this year, partly because construction activity has subsided and partly because of new capacity becoming available in some lines, notably bricks. Cement prices are expected to rise despite the new capacity of recent years. Construction labor is in excess of supply, and thousands are "exported" annually to neighboring countries. However, skilled workers (carpenters, iron workers, plasterers, mosaic workers) are in demand, with wages paid nearly double the minimums required.

• **Stockholm, Sweden,** reports that credit restrictions of late 1955 upset the usually balanced distribution of building starts with the result that construction was bunched in the summer months. Thus, a temporary shortage of carpenters and painters was created. Credit restrictions are also blamed for cutting construction activity below the 1954 level, though it is about the same as last year.

• **Vienna, Austria,** continues to put the lid on construction to prevent a bottleneck in manpower, materials, and equipment. Credit restrictions have curbed private projects and public projects have been reduced, bringing the industry under its maximum potential in 1956. As a result, no shortages developed this year in steel, cement, and skilled labor. Construction activity will be below last year, but probably equal to that of 1954.

Continued

Construction wages around the world

Rates per hour in national currency June 1956 and June 1955

Central and South America

	Exch. rate June '56	Common Labor Heavy constr.		Common Labor Building		Skilled Labor Bricklayers		Skilled Labor Carpenters		Structural Ironworkers	
City	**per $1 US**	**6/56**	**6/55**	**6/56**	**6/55**	**6/56**	**6/55**	**6/56**	**6/55**	**6/56**	**6/55**
Bogota, Colombia *ab*	2.50 Pesos*	3.12*A*	0.90	3.12*A*	0.71	1.20	0.71	1.26	1.00	1.26	1.80*B*
Buenos Aires, Arg *acde*	18.00 Pesos**	45.10	41.00	45.10	41.00	56.50	51.00	56.50	51.00	54.60	49.60
Caracas, Venez. *aef*	3.35*Bs*	14.00	14.00	11.70	11.70	29.20*C*	25.70*D*	29.20*C*	25.70*E*	25.70*E*	25.70*D*
Ciudad Trujillo, Dominican R. *ae*	1.00*RD*	2.00	1.50	2.00	1.50	2.00*g*	1.00*g*	5.00*F*	4.50*G*	5.00*H*	5.00*H*
La Paz, Bolivia *ah*	190***	1,043	445	388	186	865	233	954	350	1,000	371
Lima, Peru *ai*	19.20 Soles	48.75	28.30	40.50	24.14	60.00	40.37	60.00	40.37	60.00	45.90
Mexico City, Mex. *a*	12.50 Pesos	1.19*j*	1.19*j*	1.19*j*	1.19*j*	2.50	2.25	3.00	2.25	3.80	1.37
Montevideo, Uru. *ak*	4.30 Pesos****	1.49	1.40	1.36	1.36	1.70	1.70	1.70	1.70		
Quito, Ecuador *c*	15.15 Sucres	90	90	70	70	140	140	105	105	200	200
San Salvador, El Sal. *a*	2.50 Colones	0.40	0.30	0.25	0.20	1.25	1.00	1.25	1.00	1.25	1.00
Santiago, Chile *al*	500 Pesos#	95.00	60.40	85.00	57.00	128.00	91.20	128.00	85.20	135.00	85.20
Sao Paulo, Brazil *a*	85.00 Cr##	12.90	11.00	11.00	9.60	15.00	15.00	18.00	18.00	22.00	18.00

•*a* 8-hr day •*b* includes 44% markup for social insurance •*c* 44-hr week •*d* plus 80% for workmen's insurance and other social charges •*e* rates per day •*f* includes 7th day pay & 15 days per yr vacation •*g* per 100 bricks •*h* includes social benefits •*i* includes social insurance, unemployment tax, indemnity reserve, vacations, etc. •*j* peons •*k* plus social charges, 33.01% •*l* includes social charges, 52% •* Official, 4.60 free •** 6/55—14 pesos per $1, U.S. •*** Official: free 7,000–12,000 6/55—2,700 per $1, U.S. •***** 6/55—3.33 pesos per $1, U.S. •# 6/55—200 pesos per $1, U.S. •## 6/55—80 Cr per $1, U.S.
Ranges: •*A* 0.38–3.12 •*B* 1.00–1.80 •*C* 23.30–29.20 •*D* 23.30–25.70 •*E* 21.00–25.70 •*F* 3.50–5.00 •*G* 3.50–4.50 •*H* 3.00–5.00

Africa and the Middle East

City	**per $1 US**	**6/56**	**6/55**	**6/56**	**6/55**	**6/56**	**6/55**	**6/56**	**6/55**	**6/56**	**6/55**
Baghdad, Iraq *ab*	357 fils	1,000*A*		500*B*		400*C*		400*C*		1,000*A*	
Beirut, Lebanon *a*	3.22 L£	0.95*D*	0.95*D*	0.75*E*	0.75*E*	1.25*F*	1.25*F*	1.85*G*	1.85*G*	1.50*H*	1.50*H*
Cairo, Egypt *ab*	34.643 P	40	40*I*	30	30*J*	100	100	100*K*	100*K*	80*L*	80*L*
Casablanca, Mor. *ac*	350 Fr.	80*M*	75*N*	80*M*	75*M*	177	165	154	144	177	165
Istanbul, Turkey *d*	5.75 T£*	1.20*O*	1.00*P*	1.00*Q*	0.80*R*	1.80*S*	1.50*T*	2.50*U*	2.00*V*	2.60*W*	2.20*X*
Johannesburg, So. Africa	−/7/2¼ £	−/1/6*e*	−/1/5¾*e*	−/1/6*f*	−/1/5¾*f*	−/7/10½*ag*	−/7/9½*ag*	−/7/10½*ag*	−/7/9½*ag*	....	....
Jerusalem, Israel *ab*	1.80 I£	11.350	11.300	9.450	9.000	11.050	10.800	12.000	11.650	12.200	10.800
Natal, So. Africa	−/7/2 £	−/−/8½*hi*	....	−/−/8½*hi*	....	−/3/9*aj*	....	−/3/9*aj*	....	−/3/9*kl*	....
Salisbury, So. Rhodesia *m*	−/8/− R£	−/1/3*n*	....	−/1/3*n*	....	−/11/−*o*	....	−/10/6*o*	....	−/8/6*op*	....
Tangier, Morocco *a*	43.85 MP	6.25*Y*	4.30*Z*	4.25	4.00	10	8	13*AA*	15*BB*	....	....
Tel-Aviv, Israel *ab*	1.80 I£	....	....	8.230*q*	7.460	9.550	8.480	9.550*q*	8.480	....	....

•*a* 8-hr day •*b* rate per day •*c* 10-hr day, maximum 50 hr week permitted to allow for time lost because of weather •*d* 10-hr day •*e* 9 1/5-hr day; plus housing levy •*f* 8 1/5-hr day; plus housing levy •*g* includes holiday pay, benefit fund, workmen's compensation •*h* 8 2/5-hr day •*i* plus cost of living −/16/9, −/2/6 housing, −/2/6 holiday pay per week •*j* plus cost of living −/3/6, −/−/5½ holiday pay per hour and −/6/8 pension fund per week •*k* 9¼-hr day •*l* plus cost of living −/2/7½, −/−/3 holiday pay per hour •*m* 42-hr week •*n* African labor •*o* European labor •*p* 45-hr week on heavy construction at −/11/2 per hour •*q* organized labor rates •* Official, special rate set 10/56; 6/55, 2.825
Ranges: •*A* 500–1,000 •*B* 300–500 •*C* 250–400 •*D* 0.80–0.95 •*E* 0.65–0.75 •*F* 1.00–1.25 •*G* 1.25–1.85 •*H* 1.25–1.50 •*I* 30–40 •*J* 25–30 •*K* 90–100; 1955, 80–100 •*L* 60–80 •*M* 67–80 •*N* 57–75 •*O* 1.00–1.20 •*P* 0.75–1.00 •*Q* 0.80–1.00 •*R* 0.65–0.80 •*S* 1.20–1.80 •*T* 1.00–1.50 •*U* 2.00–2.50 •*V* 1.50–2.00 •*W* 2.20–2.60 •*X* 1.80–2.20 •*Y* 5.00–6.25 •*Z* 3.15–4.30 •*AA* 5–13 •*BB* 5–15

North America and U. S. Territories

City and Country	**per $1 US**	**6/56**	**6/55**	**6/56**	**6/55**	**6/56**	**6/55**	**6/56**	**6/55**	**6/56**	**6/55**
Anchorage, Alaska *a*	$1.00	$3.285	$3.285	$3.25	$3.25	$4.39	$4.39	$3.69	$3.69	$4.035	$4.035
Havana, Cuba *a*	1 Peso	0.55		0.52		0.83		0.83		1.18	
Honolulu, Hawaii *a*	1.00	1.56	1.46	1.56	1.46	2.50	2.40	2.20	2.10	2.50	2.50
Montreal, Canada *ab*	0.98¾	1.30	1.25	1.30	1.25	2.10	2.00	1.90	1.80	2.00	1.90
New York, U.S.A. *c*	1.00	2.70*a*	2.415*a*	2.70*a*	2.415*a*	4.15*d*	4.15*d*	3.834*d*	3.57*d*	4.18*a*	3.975*a*
Ottawa, Canada *a*	0.98 17/32	1.05	1.00	1.15*A*	1.00	2.20	2.10	1.92*e*	1.82	2.20	2.05
San Francisco, U.S.A. *c*	1.00	2.425*a*	2.275*a*	2.425*a*	2.275*a*	3.875*d*	3.65*d*	3.16*c*	3.005*a*	3.35*a*	3.175*a*
San Juan, PR *a*	1.00	0.50*f*	0.50*f*	0.50	0.50	1.00	1.00	0.90	0.90	1.25	1.00
Winnipeg, Canada	0.98 17/32	1.20*g*	1.10*g*	1.40*g*	1.30*g*	2.25*h*	2.25*h*	2.05*h*	2.05*h*	2.20*h*	2.10*h*

•*a* 8-hr day •*b* plus 8% fringe benefits •*c* includes fringe benefits •*d* 7-hr day •*e* plus 4% for vacation fund •*f* revised minimum for jobs within Commonwealth. Where U.S. Interstate Commerce laws apply, minimum is $1 •*g* 48-hr week •*h* 40-hr week
Ranges: •*A* 1.05–1.15

. . . Construction cost trends around the world

Asia and Australia

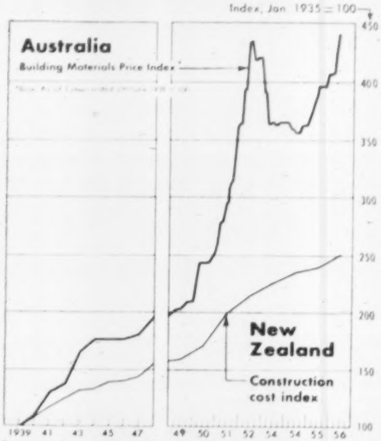
• **Bankok, Thailand,** reports that while the supply of construction materials is good, neither skilled or unskilled labor is plentiful. Activity is generally running below the level that was established in 1954.

• **Bombay, India,** is working feverishly to house its expanding population. The boom is particularly noticeable in Bombay, Calcutta, and Delhi, where both private and public bodies are constructing apartments, as well as offices and public buildings. However, nationalization of the insurance companies (which have fostered much of the private construction) may cut down on future private building. The Government of India and the states hope to take up the slack in housing construction. The brisk pace of new building has more than absorbed the increased output of cement, steel, glass, and wood. Skilled labor is scarce, but the big supply of unskilled labor tends to hold wages in check. More than two million skilled and unskilled workers have been engaged on the multi-purpose river valley projects in the Punjab, in Bengel, southern Madras, Andhra, and Orissa. A new task force is now being assembled for the purpose of starting construction on the Government's three new steel plants.

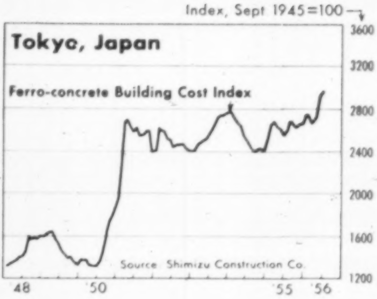
• **Colombo, Ceylon,** continues to have shortages of skilled workers. Foreign contractors (mostly British) provide on-the-job training to overcome the handicap. There are large reservoirs of unskilled labor. Public construction provides the main impetus, with British and German firms now engaged on a dam, bridge, and hospital construction. Residential building is being boosted by state loans to house builders. Imported materials (all steel and two-thirds of the cement) are subject to sharp price fluctuations when shortages occur.

• **Manila, Philippines,** report construction hamstrung by sky-rocketing prices for steel, cement, and lumber, brought about partly by restrictions on imports and partly by heavy demand created by large government projects. Cement has been the worst headache, despite imports from Japan. A new private cement plant is expected to relieve the shortage by the end of 1956. Attempts are also being made in an effort to lift or reduce the tariffs collected on imports.

• **Melbourne, Australia,** notes a slight recession in construction this year as a result of credit restrictions and general economic uneasiness. Private residential building has been most affected. Commercial building continues brisk, but the future outlook is obscure. Public construction is being slowed by the lack of funds. Both labor and materials are in good supply generally. American contractors have established a good reputation for themselves in regard to on-time execution of contracts.



Source: Commonwealth Bureau of Census and Statistics
New Zealand Ministry of Works



Source: Shimizu Construction Co.

• **Tokyo, Japan,** has pushed construction activity 15% ahead of last year. The gain is concentrated largely among big contractors. Except for structural steel and reinforcing steel, materials are in good supply. All labor is plentiful.

• **Wellington, New Zealand,** feels that credit restrictions and manpower shortages will reduce construction activity this year. However, there is a substantial backlog of projects to be released as soon as funds become available. Foreign contractors, including those from the U. S., are expected to get the lion's share of the bigger jobs. Delays in deliveries of steel and lumber are still being encountered, but the situation is improving.

. . . Construction wages around the world

Europe

City	Exch. rate June '56 per $1 US	Common Labor: Heavy constr. 6/56	Heavy constr. 6/55	Building 6/56	Building 6/55	Skilled Labor: Bricklayers 6/56	Bricklayers 6/55	Carpenters 6/56	Carpenters 6/55	Structural Ironworkers 6/56	Structural Ironworkers 6/55
Amsterdam, Nthlds *ab*	3.79 Florin			2.159	2.133	2.159	2.133	2.179*c*	2.153*c*	2.136	2.062
Athens, Greece *de*	30 Drch	110*A*	80*B*	65*C*	65*D*	140*E*	130*F*	150*G*	150*H*	130*F*	130*F*
Bonn, W. Germany *d*	4.19 DM	2.12	2.01	1.95	1.81	2.24	2.12	2.24	2.12	2.24	2.12
Brussels, Belgium *dfg*	50 Fr	24.50*I*	22.80*J*	27.50*K*	25.65*L*	30.50*M*	28.45 *N*	30.50*M*	28.45 *N*	30.50*M*	28.45 *N*
Copenhagen, Den. *d*	6.92 Kr.	5.63*h*	5.38*i*	5.63*h*	5.38*i*	6.97*j*	6.80*k*	6.61*l*	6.42*m*		
Dublin, Ireland *n*	7 Sh.			-/3/6	-/3/3	-/4/2	-/3/11	-/4/2	-/3/11	7/19/6*o*	7/8/6*o*
Genava Switz. *d*	4.28 Sw. fr.	2.68	2.53	2.68	2.53	3.20	3.05	3.27	3.17	3.20	3.08
Helsinki, Finland *p*	231 F. mk.	150	143	135	127	263*O*	263*O*	263*O*	263*O*	263*O*	263*O*
Lisbon, Portugal *d*	28.60 Esc.	4.00	3.80	4.00	3.80	5.00	5.00	6.25	6.00	7.50	7.00
London, England *dq*	-/7/2	-/3/10½	-/3/7	-/3/10½	-/3/7	-/4/5	-/4/1½	-/4/5	-/4/1½	-/4/3	-/3/11
Madrid, Spain *drs*	38.95*P*	2.99	2.58	2.99	2.58	4.75	4.09	4.75	4.09	2.50	3.02
Oslo, Norway *ar*	7.14 N. kr.	7.43	6.71	6.06	5.08	7.34	6.21	6.14	5.38		
Paris, France *dt*	350 Fr	194*u*	179*u*	194*u*	179*u*	350*u*	191*u*	310*v*	195*v*	328*w*	213*w*
Rome, Italy *dx*	624.80 Lire	304.00	282.22	304.00	282.22	340.00	316.00	374.00	347.33	374.00	347.33
Stockholm, Sweden *ar*	5.18 Kr	7.00	6.00*P*	7.00	6.00*P*	9.00	8.00	9.00	8.00	7.00	6.00
Vienna, Austria *d*	26.8	6.75	6.20	6.75	6.20	7.80*z*	7.15*z*	8.10*z*	7.45*z*	7.40	6.80

•*a* 8½-hr day •*b* includes social charges based on "tariff-works" (piece work) rates •*c* includes 0.02 f per hr compensation for own tools •*d* 8-hr day •*e* per day •*f* 6-day week •*g* linked to cost of living plus extra 29.4% social security paid by contractor •*h* 3rd Q 1955; 4th Q, 5.89 •*i* 3rd Q 1954; •*j* 3rd Q, 1955; 4th Q, 7.07 •*k* 3rd Q 1954; •*l* 3rd Q 1955; 4th Q, 7.03 •*m* 3rd Q 1954 •*n* 44-hr week •*o* per 44-hr week •*p* 46½-hr week except May–September 45 hrs •*q* excludes social charges: 6/55, 12½% •*r* 48-hr week •*s* basic minimum rates, excluding social charges which add 80%–90% in '56; 110–125% in 1955. In '56, government assumed part of charges. •*t* actual wages paid are 20% higher •*u* includes social charges 6/56, 54.11%; 6/55, 41.74% •*v* includes social charges 6/56, 52.82%; 6/55, 44.19% •*w* includes social charges 6/56, 53.39%; 6/55, 41.74% •*z* includes social insurance, paid holidays and other social charges •*y* includes 0.10 tool compensation for bricklayers; 0.25 for carpenters.

Ranges: •*A* 80–110 •*B* 65–80 •*C* 57–65 •*D* 58–65 •*E* 115–140 •*F* 120–130 •*G* 115–150 •*H* 120–150 •*I* 23.70–24.50 •*J* 21.35–22.80 •*K* 26.70–27.50 •*L* 24.00–25.65 •*M* 29.60–30.50 •*N* 26.65–28.45 •*N* 26.65–28.45 •*O* 210–263 •*P* 5.00–6.00

Asia and Australia

City	per $1 US	6/56	6/55	6/56	6/55	6/56	6/55	6/56	6/55	6/56	6/55
Bangkok, Thailand *a*	35 Baht	15.00	15.00	25.00	25.00	70.00	70.00	60.00	60.00	35.00	35.00
Bombay, India *ab*	4.12 RS	-/8/-	-/8/-	-/6/-	-/6/-	-/12/-	-/12/-	-/12/-	-/12/-	1/4/-	1/4/-
Colombo, Ceylon *ac*	4.74 Cey. RS	0.37	0.32	0.37	0.32	0.46	0.41	0.46	0.41	0.46	0.41
Karachi, Pakistan *a*	4.76* Pak. RS	-/8/-	-/6/-	-/6/-	-/4/9	1/-/-	-/13/-	1/-/-	-/13/-	1/-/-	-/12/-
Manilla, P. I. *a*	2.00** P	.50	.50	.50	.50	1.25*A*	1.25*A*	1.25*A*	1.25*A*	1.25*A*	1.25*A*
Melbourne, Aust. *ade*	-/9/- £	22/18/4 *B*	21/17/3 *C*	22/18/4 *B*	21/17/3 *C*	24/6/11	22/15/-	23/13/1	21/18/2	20/1/9 *D*	18/10/3 *E*
Tokyo, Japan *a*	360 Y	66.00	66.00	54.00	54.00	84.00	84.00	77.50	77.50	81.00	81.00
Wellington, N.Z. *ad*	-/7/1 £	10/14/-	10/13/4	10/15/8	10/15/8	13/3/4	11/19/8	11/16/5	11/12/8	12/3/4	11/10/9

•*a* 8-hr day •*b* per day •*c* minimum rates set by State Wage Boards. Includes cost of noon day meal. •*d* per 40-hr week •*e* includes paid holidays, statuatory and unofficial additions •*f* minimum rates

Ranges: •*A* .75 to 1.25; carpenters .625 to 1.25 •*B* 19/-/6 to 22/18/4 •*C* 18/-/2 to 21/17/3 •*D* 12/18/- to 20/1/9 •*E* 12/12/- to 18/10/3. •* 6/55 rate: 3.335 Rs •** 6/55 rate: 2.34 P.

EDITORIAL

Will New Roads Save Live

With the nation's highway death tolls rising year by year, the new Federal Inter- Act offers a strong ray of fact

41,000 miles of new expresswa be built. They will be wider, st safer roads. Crossings will b eliminated. If speeds are sen will be fewer acci

IKE SIGNS BIGGEST ROAD BILL EVER

Washington, D. C., June 29. Among some 50 bills signed by the President today was the $32,900,000,000 Federal Interstate Highway Aid bill passed by th

ONE GOAL

Since 1949, Caterpillar, your partner in earthmoving progress, has campaigned for better highways

1,000 MILES
OF NE
ON T

Washingto
President
go-ah

GIANT ROAD BILL SIGNED

$32.9 BILLION HIGHWAY BILL GETS GREEN LIGHT FROM IKE

Washington, D. C., June 29—The largest public works program in history was signed into law by President Eisenhower today.

It calls for construction of 41,000 miles of free expressways linking practically every large city and state capital in the nation. The building will take 13 years and cost $32,900,000,000. But the huge program will cost the average driv extra

$33 Billion Highway Bill OK'd by Ike

Washington, D. C., June 29. President Eisenhower today signed into law the Federal Interstate Highway bill, largest public works program in history. It provides for Federal expenditures of $32,900,000,000 to build 41,000 miles of superhighw next 13

9500 LIVES SAVED

There were many good and compelling economic reasons for

victim roads

IKE APPROVES BILLIONS FOR NEW HIGHWAYS

Georgia's Share of Highway Funds Over $800 Million

Washington, D. C., July 2. The Government will spend $838,700,000 for highways in Georgia dur-

STOP
CATERPILLAR DIESEL

March, 1949

Accident
CATERPILLAR DIESEL

November, 1949

How long must this go on?
CATERPILLAR DIESEL

January, 1950

One Life Less?
CATERPILLAR DIESEL

February, 1950

DEATH had a busy weekend
CATERPILLAR

September, 1950

How you got out of the mud
CATERPILLAR

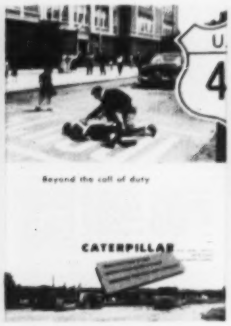
November, 1950

Death trap
CATERPILLAR

February, 1952

Detour for Death
CATERPILLAR

June, 1952


U.S. 4
Beyond the call of duty
CATERPILLAR

September, 1952

Where do you go from here?
CATERPILLAR

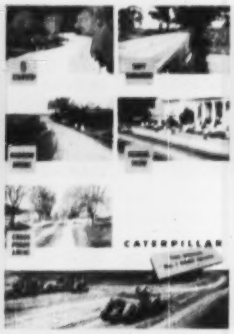
November, 1952

The road that wasn't there
CATERPILLAR

February, 1953

How Long is Your Memory?
CATERPILLAR

March, 1953


CATERPILLAR

May, 1953

An apple for the coroner
CATERPILLAR

September, 1953

HELP!
CATERPILLAR

October, 1953

Red lines and yellow machines
CATERPILLAR

November, 1953

...and the band played on
CATERPILLAR

January, 1954

CATERPILLAR

February, 1954

CATERPILLAR

May, 1954

CATERPILLAR

June, 1954

Early in 1949, Caterpillar Tractor Co. began a series of full-page 4-color advertisements in *The Saturday Evening Post* and other national magazines. These pages were designed to forcefully awaken the public to the frightful toll of lives and money taken yearly by inadequate roads.

The 40 advertisements, reproduced in miniature above, give some idea of

January, 1955

February, 1955

March, 1955

April, 1955

May, 1955

July, 1955

September, 1955

October, 1955

November, 1955

December, 1955

January, 1956

February, 1956

March, 1956

April, 1956

May, 1956

June, 1956

July, 1956

August, 1956

September, 1956

October, 1956

the continuing impact carried by this campaign. In the last two years emphasis has been changed to show how various states are meeting the highway problem.

With a strong awareness of highway needs now in the public mind, the new Federal Interstate Highway Program has been enacted into law. The next two pages show a breakdown of probable highway expenditures by states.

Ala. $730,800,000

Ariz. $424,200,000

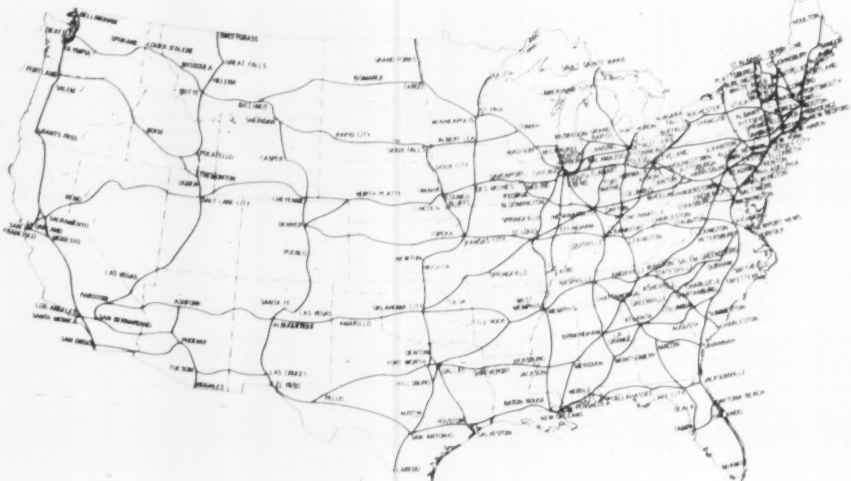
Ark. $529,000,000

Cal. $2,019,600,000

THE NEW INTERSTATE HIGHWAY SYSTEM AND PROPOSED FEDERAL AID TO STATES

These are the estimated Federal grants to states for the next 13 years, to be used for both the Interstate Highway System and other Federal-Aid roads.

These figures represent 90% of the cost for the Interstate System, 50% for the remainder.



Minn. $829,600,000

Nev. $371,100,000

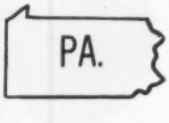
N.H. $204,800,000

N.J. $753,900,000

N.M. $450,700,000

Okla. $661,200,000

Ore. $507,900,000

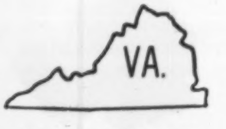


Pa. $1,865,800,000

R.I. $216,400,000

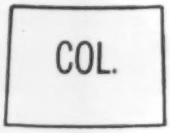
Utah $351,900,000

Vt. $201,200,000



Va. $718,400,000

Wash. $582,000,000



Col. $518,300,000

Conn. $342,500,000

Del. $202,200,000

Fla. $608,400,000

Ga. $838,700,000

Idaho $364,300,000

Ill. $1,668,500,000

Ind. $872,100,000

Iowa $751,300,000

Kan. $683,300,000

Ky. $666,900,000

La. $588,500,000

Me. $284,400,000

Md. $418,700,000

Mass. $735,700,000

Mich. $1,277,600,000

Miss. $574,000,000

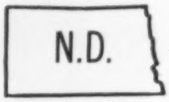
Mo. $986,400,000

Mont. $539,000,000

Neb. $544,100,000

N.Y. $2,469,500,000

N.C. $903,500,000



N.D. $406,900,000

Ohio $1,509,300,000

S.C. $476,900,000

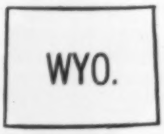
S.D. $427,700,000

Tenn. $766,800,000

Texas $2,112,500,000

W.Va. $418,200,000

Wisc. $822,600,000



Wyo. $369,900,000

D.C. $220,900,000

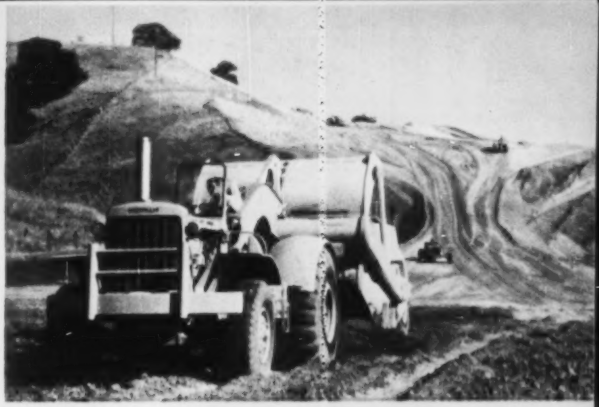
CATERPILLAR— your partner in earthmoving progress— has the equipment ready for the big job

The mighty D9, with 320 Turbocharged engine HP and No. 9S Loadshape Bulldozer, heads the line of six Caterpillar crawler Tractors. The other machines, with engine HP, are: D8—191 HP, D7—128 HP, D6—93 HP, D4—63 HP, and D2—48 HP.

The Turbocharged 300 HP DW21 with the 25 cu. yd. (heaped) capacity No. 470 LOWBOWL Scraper provides a fast, highly maneuverable earthmoving unit.

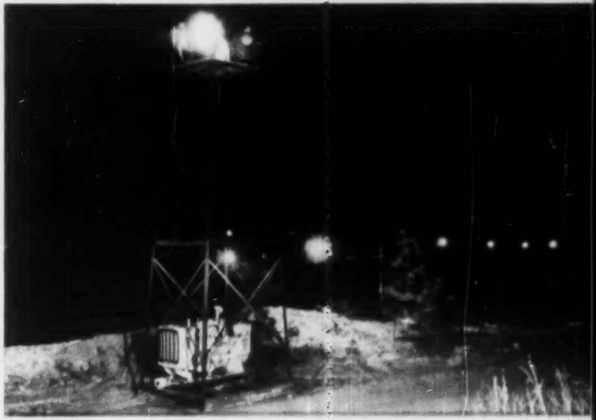
The No. 977 Traxcavator of 2¼ cu. yd. bucket capacity is the largest of the three Cat-built tractor-shovels. The No. 955 has a 1½ cu. yd. bucket; the No. 933, a 1 cu. yd. bucket. Lift forks and other attachments give added versatility to these highly productive units.

The No. 8 Ripper, for use with the D8 Tractor, is one of a line of five Cat-built tractor-mounted rippers. In addition to the No. 8, they are: the No. 9, the No. 6, the No. 4 and the No. 2 for use with other Caterpillar-built Tractors and Traxcavators.



The four-wheel DW20, with Turbocharged 300 HP Cat Engine, teams up with the LOWBOWL No. 456 Scraper (25 cu. yd. capacity) for high-speed earthmoving on longer hauls. The four-wheel 186 HP DW15 works with the No. 15 Scraper (12½ cu. yd. capacity).

Representative of the Cat four-wheel, crawler-drawn Scraper line is the No. 463. Heaped capacities are: No. 90, 27 cu. yd.; No. 463, 25 cu. yd.; No. 70, 15 cu. yd.; No. 60, 9 cu. yd.; and No. 40, 4.5 cu. yd.



Caterpillar Electric Sets are available in eight basic models ranging from 30 to 350 KW. Available in portable units, they are a reliable and convenient source of electric power.

Nine basic sizes, from 65 to 650 HP, make up the line of Caterpillar Diesel Engines. They are used by over 100 manufacturers to power excavators, compressors, crushers and other construction machines.

Heading the line of three Cat Motor Graders is the 115 HP No. 12. The No. 112 has 75 HP; the No. 212 has 50 HP.

N. J. GIRDS TO PUSH ROAD CONSTRUCTION

Highways Officials and Senators Confer on Possible One-Cent Gas Tax Rise

Trenton, June 29. The ex- hway program,

tion, according to state highway officials here. New Jersey ceive over a billion dol-

a 90-10 basis for interstate roads, and one-third on a 50-50 basis to finance primary, sec ndary and urban roads. Th

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41,000 Miles of Super-Highways i New Federal Bill

Next year—and the years ahead—offer you the greatest challenge in the whole history of construction. The highway work alone will dwarf any previous undertaking.

Caterpillar has been preparing for this time. Plant capacity has been doubled and is still expanding. New and improved products are now in full production, giving you equipment designed and built to do more work, faster, at lower cost. When you bid on a contract, that kind of equipment can make the difference between profit and loss.

Caterpillar leadership is leadership *in action.* It never stands still. The full resources of Caterpillar research, both in the laboratory and right in the field with you, are constantly devoted to the development of even more efficient engines and earthmovers—equipment that keeps pace with your increasing opportunities.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

*Caterpillar, Cat and Traxcavator are Registered Trademarks of Caterpillar Tractor Co.

YOUR PARTNER IN EARTHMOVING PROGRESS

STATE TO GET $230 MILLION IN FEDERAL FUNDS BY 1959

Illinois Total Over $1½ Billion for 13-Year Highway Building Era

Washington, D. C., July 3. Estimates released by the U. S. Bureau of Public Roads call for $229,700,000 of Federal funds to be spent in Illinois in three years, starting July 1, 1956.

This represents 90 per cent of Interstate road construction costs. The state will furnish the additional 10 per cent. For the full 13-year period covered by the Federal Highway bill it is estimated Illinois will receive nearly $1,700,000,000.

HIGHWAY BILL BOON TO UTAH ROAD SYSTEM

Salt Lake City, July 3—Over-all spending in Utah for highways in the next three years will rise from $25.2 million to $88.6 million. And for the succeeding 10-year period it will continue in the $75 to $95 million bracket.

This will result from the new 13-year road building program signed into law by President Eisenhower. By 1970 Utah will be criss-crossed by splendid four and six lane divided highways.

The state now has some 700 miles of interstate highways and the bill provides for a rebuilding of an amount equal to this mil

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41,000 MILES OF HIGHWAYS APPROVED BY PRESIDENT

Washington, D. C., June 29—You're going to get 41,000 miles of new four, six and eight lane highways in the next 13 years.

It became official today when President Eisenhower signed the Federal Interstate Highway bill. Under the new law, the Federal government will spend $32,900,000,000 through 1969 for the new roads.

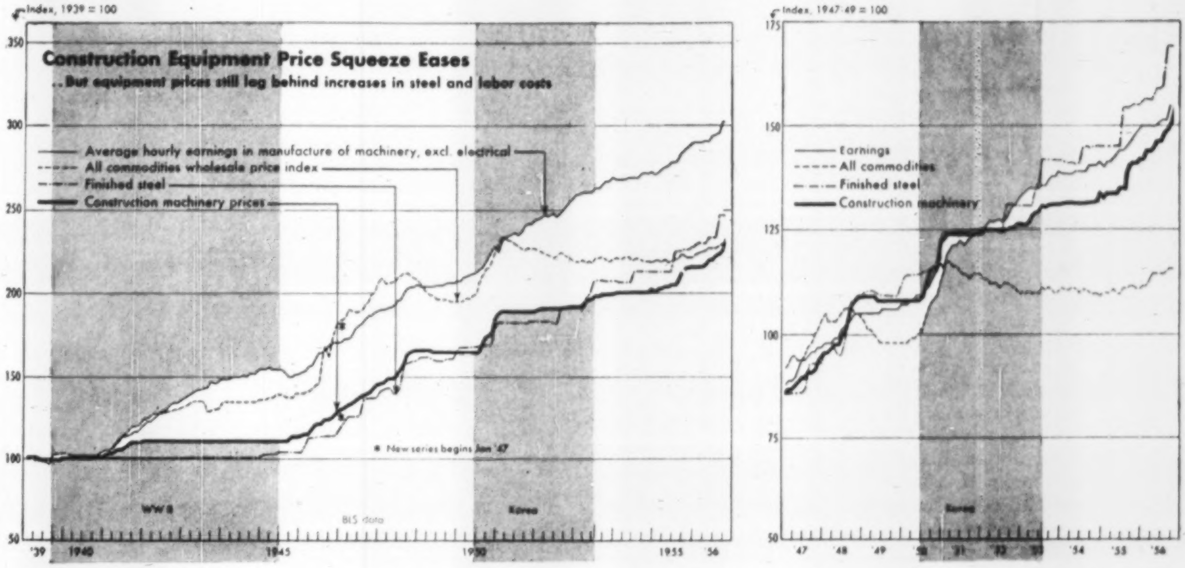
The bill calls for a vast network of free superhighways linking most major cities and state capitals.

$32.9 Billion Highway Bill a Bargain for Car Owner

New Taxes on Gas, Tires to Cost Average Driver Only $8.60 per Year

Washington, D.C., July 2. The Federal Highway Aid bill, which has been high on the resident's list of must legis- As high-

It is a pay-as-you-go program. But the $33 billion total, to be paid for by a 1-cent increase in the gasoline tax, 3 cents a pound for tires and a 2 per cent rise in the price of trucks, buses and trailers, will result in safer, more economical driving. The average car owner will pay only $8.60 a hould save much


Construction Equipment Price Squeeze Eases

..But equipment prices still lag behind increases in steel and labor costs

Construction Machinery Price Index

Bureau of Labor Statistics, U. S. Department of Labor, 1947-49 = 100

By type	1947 Jan.	1948 Jan.	1949 Jan.	1950 Jan.	1951 Jan.	1952 Jan.	1953 Jan.	1954 Jan.	1955 Jan.	1956 Jan.	1956 Oct.
Constr machy, all types	86.3	95.8	108.7	108.0	123.1	124.6	126.2	131.2	133.2	143.2	154.4
Power cranes, etc	87.7	95.4	108.3	106.9	123.3	123.6	124.2	129.9	133.8	143.6	154.3
Machinery, tractor mounted	83.2	93.8	108.9	109.7	122.9	127.5	131.3	133.2	134.5	141.8	150.8
Specialized machinery	84.2	100.7	106.5	106.1	119.3	119.5	119.3	124.3	122.8	133.4	140.1
Portable air compressors	93.6	98.0	105.4	105.4	124.8	124.8	124.8	124.8	132.0	133.6	133.2
Scrapers and graders	85.9	95.9	110.0	108.4	127.3	128.6	129.6	129.4	129.4	138.0	148.9
Air tools, hand tools	89.6	97.5	106.0	106.8	120.5	120.5	120.5	125.0	125.0	135.7	150.0
Mixers, pavers, etc	89.3	95.6	107.7	105.9	117.9	118.5	117.7	122.9	122.7	133.3	138.1
Tractors, non-farm	84.1	95.0	110.1	110.3	123.9	126.6	131.1	139.5	141.6	153.5	168.7

All types by year and month

	1947	1948	1949	1950	1952	1953	1954	1955	1956
Av	**90.0**	**101.8**	**108.3**	**111.5**	**125.5**	**129.3**	**131.6**	**137.1**	....
J	86.3	95.8	108.7	108.0	124.6	126.2	131.2	133.2	143.2
F	86.9	95.4	108.7	108.0	125.2	126.2	131.5	133.8	143.5
M	87.0	97.3	108.6	108.0	125.2	127.1	131.7	133.8	143.5
A	87.5	97.5	108.5	108.0	124.9	128.6	131.6	134.1	144.6
M	88.5	97.6	108.3	108.2	125.5	129.1	131.5	134.3	146.6
J	89.5	99.5	108.3	108.1	125.4	129.4	131.5	134.7	146.8
Jl	90.3	101.4	108.3	108.8	125.4	130.8	131.5	134.7	147.8
A	90.9	104.1	108.1	112.6	125.3	130.5	131.5	138.2	149.4
S	91.4	106.7	108.1	114.6	125.8	130.9	131.6	140.5	151.5
O	92.3	108.0	108.1	115.6	125.8	131.0	131.6	142.1	154.4
N	93.7	108.6	108.0	116.2	126.2	131.1	131.8	142.4	....
D	94.7	108.7	108.1	121.7	126.3	131.1	132.6	143.1	....

Construction Equipment Cost Index, 1926 = 100

By Marshall & Stevens, Chicago

1913	63.0	**1924**	107.2	**1935**	79.7	**1946**	124.2
1914	59.2	**1925**	105.4	**1936**	83.0	**1947**	150.3
1915	61.2	**1926**	100.0	**1937**	87.2	**1948**	161.1
1916	67.5	**1927**	95.9	**1938**	82.9	**1949**	161.1
1917	88.2	**1928**	96.8	**1939**	82.4	**1950**	166.2
1918	122.6	**1929**	91.0	**1940**	83.4	**1951**	177.3
1919	129.0	**1930**	86.1	**1941**	92.0	**1952**	177.8
1920	154.4	**1931**	77.6	**1942**	100.8	**1953**	179.6
1921	119.7	**1932**	71.9	**1943**	101.3	**1954**	183.0
1922	83.5	**1933**	71.8	**1944**	101.6	**1955**	188.2
1923	97.3	**1934**	76.0	**1945**	102.5	**9 56**	207.9

Construction Equipment Rental Rates

Associated Equipment Distributors, Chicago, Ill.

All rates are fob lessor's warehouse or shipping point. Lessee pays transportation costs to destination and return. Rates do not include operator, fuel or oil. Lessor bears cost of repairs due to normal wear and tear on non-tractor equipment, the lessee bears all other costs. For tractor and rubber-tired hauling equipment, the lessee bears all costs for maintenance and repair. Rates are based on one shift of 8 hours per day, 40 hours per week, 175 hours per month of a 30 consecutive day period. Overtime is prorated on a per-hour basis. Equipment is delivered to lessee in good operating condition and returned in as good condition less normal wear. Excessive cleaning or repairs may be charged to lessee. Rental rates start when equipment leaves lessor's delivery point. All rents are payable in advance. No insurance, license, sales or use taxes are included in these rates.

EQUIPMENT RENTAL RATES vary greatly throughout the United States, depending upon local practices and conditions. A compilation of prevailing rental rates (representing as nearly as could be determined an over-all average of rental rates throughout the United States for specified types of equipment) has been made for informational purposes only by the Associated Equipment Distributors, 30 East Cedar St., Chicago, Ill., and is available at $5 per copy. Selected items from the Seventh Edition published in 1956 are reported here.

Type of equipment	Per month	Per week	Per day
Air compressors, portable:			
Gas, 86–105 cf, 100 psi	$188.00	$62.50	$18.75
Gas, 126–160 cf, 100 psi	245.00	82.00	24.50
Gas, 186–210 cf, 100 psi	333.00	109.00	32.75
Gas, 251–315 cf, 100 psi	444.00	146.00	44.50
Diesel, 186–210 cf, 100 psi	413.00	137.00	42.50
Diesel, 251–315 cf, 100 psi	533.00	176.00	56.00
Diesel, 366–420 cf, 100 psi	711.00	234.00	79.25
Diesel, 501–600 cf, 100 psi	917.00	307.00	98.50
Air tools:			
Clay spades, incl. scoop	$34.75	$12.75	$4.05
Drifters, medium	101.00	35.50	11.00
Hoists, 1501–2500 lb singl dr	88.75	29.50	9.20
Hoists, 2501–3500 lb singl dr	123.00	41.00	13.00
Hose, ¾ in, per 50 ft length	8.95	3.80	1.60
Pavement breakers, 1–69 lb	46.50	16.00	5.05
Pavement breakers, 70–95 lb	51.25	18.00	5.70
Rotating rock drill, 1–25 lb	40.25	14.25	4.45
Rotating rock drill, 40–50 lb	46.75	16.50	5.15
Rotating rock drill, 65 lb & up	54.25	19.00	5.90
Tampers, single	35.25	12.75	4.05
Vibrators, pneu pwr flexible, 20–35 lb	62.50	20.50	6.30
35–50 lb	69.25	23.00	7.35
Wagon drill, with air hoist, medium	245.00	84.25	27.50
heavy	269.00	96.00	32.00
Boilers: Vertical, 20–25 hp	148.00	......	......
Vertical, 50–60 hp	241.00	......	......
Horizontal, 55–70 hp	310.00	......	......
Horizontal, 90–125 hp	438.00	......	......
Buckets: Clamshell, ⅜ cy	97.50	32.50	10.75
Clamshell, ¾ cy	136.00	47.00	15.25
Clamshell, 1½ cy	216.00	71.50	23.75
Concrete, bottom dump, 1 cy	60.25	21.25	7.50
Concrete, bottom dump, 2 cy	105.00	35.50	11.75
Dragline, 1 cy	125.00	42.50	14.00
Dragline, 1½ cy	162.00	54.50	17.75
Dragline, 2 cy	198.00	66.00	22.00
Bulldozers—see tractors			
Concrete carts, power driven:			
Manually guided	106.00	37.75	11.50
Carriers operator	136.00	46.50	15.00
Cranes, cap at ft radius:			
Crawler, gas 5–6½ ton, 10′	761.00	248.00	82.00
7⅝–8¾ ton at 12′	940.00	309.00	103.00
24½–33½ ton at 12′	1,878.00	607.00	195.00
Crawler, diesel			
5–6½ ton at 10′	873.00	280.00	92.50
7⅝–8¾ ton at 12′	1,078.00	348.00	115.00
24½–33½ ton at 12′	2,124.00	696.00	226.00
Truck mounted, gas			
5–7 ton 10′	947.00	303.00	98.75
17½–20 ton at 10′	2,219.00	739.00	238.00
30–35 ton at 10′	4,010.00	1,405.00	457.00
Dragline excavators:			
Crawler mounted, gas ¾ cy	1,213.00	401.00	125.00
Crawler mounted, gas 1½ cy	2,290.00	711.00	239.00
Crawler mounted, diesel ¾ cy	1,308.00	444.00	147.00
Crawler mounted, diesel 1½ cy	2,383.00	761.00	250.00
Truck mounted, gas ¾ cy	2,233.00	701.00	229.00
Truck mounted, diesel ¾ cy	2,156.00	758.00	242.00
Engines:			
Diesel, with clutch 70–90 hp	319.00	105.00	35.50
Diesel, clutch, 115–140 hp	489.00	160.00	55.00
Diesel, clutch, 165–185 hp	836.00	280.00	94.25
Finishing machines:			
Bituminous, crawler, self propelled, gas	1,377.00	445.00	136.00
Conc floor, powered, 30–36″ d	90.00	31.50	10.50
Conc highway finisher, 10–15′	881.00	292.00	108.00
Pile hammers:			
McKiernan-Terry #S-3	372.00	126.00	60.00
McKiernan-Terry dbl-actg #1	84.25	30.50	9.50
dbl actg 9B 2 or 3	357.00	122.00	38.25
Vulcan, single acting #1	442.00	......	......
Vulcan, double acting, #50C	497.00	......	......

Continued on following page

Do You Have This PIPE PROTECTION PROBLEM?

Underground piping must be protected against destructive forces of corrosive soils and electrolytic conditions. Normally, coal tar coating as called for in AWWA specifications C-203 and C-204 would be hot-applied at a coating mill. However, there are times when the volume of pipe involved or the distance of a coating mill make this impractical from a time and cost standpoint.

You'll find the ANSWER with TAPECOAT® . . . the Quality Coal Tar Coating in Tape Form

TAPECOAT is the widely-accepted alternate material that is equivalent to mill-applied hot coal tar protection. With this easy-to-use material, protection can be applied in the field by your own men, because technical know-how, kettles and special crews are not required. You save time and money while providing the long-life protection called for.

TAPECOAT is easily applied, using a torch to soften or bleed the pitch which gives both bond and protection. Available in widths from 2" to 24", it is spirally wrapped or cigarette wrapped around pipe, pipe joints, couplings, conduit, cable, and insulated piping.

Write for illustrated brochure.

Visit us in Booth 124
PLANT MAINTENANCE and ENGINEERING SHOW—
PUBLIC AUDITORIUM—
Cleveland
Jan. 28-31, 1957

The TAPECOAT® *Company*

Originators of Coal Tar Coating in Tape Form

1551 Lyons Street
Evanston, Illinois

Equipment Rental Rates—AED

Continued from preceding page

Type of equipment	Per month	Per week	Per day
Hoists:			
Air, 1500–2500 lb single dr	$88.75	$29.50	$9.20
Air, 2500–3500 lb single dr	123.00	41.00	13.00
Chain, up to 1½ ton	21.00	7.05	2.30
Chain, 2½ to 4 ton	33.00	12.25	3.95
Gas, single drum, 14–22 hp	93.00	30.75	9.75
Gas, single drum, 29–42 hp	126.00	42.25	14.00
Gas, double drum, up to 22 hp	104.00	35.25	10.50
Gas, double drum, 28–45 hp	162.00	56.75	17.25
Elec. single drum, 17–27 hp	91.50	28.50	......
Elec. double drum, 17–27 hp	18.00	35.57	......
Elec. three drum, 47–57 hp	267.00	88.50	......
Mixers, concrete:			
Tilting dr, low charg 0–3½ cf	66.00	23.25	7.90
Non-tilting drum			
low charger 3½–6½ cf	83.25	28.50	9.65
power charger, 3½–6½ cf	125.00	43.00	13.75
power charger, 10½–12 cf	183.00	65.00	22.00
Paver, #34-E, dual drum	3,142.00	878.00	236.00
Pumpcrete, conc pump, remix:			
Gas, Mod. 160 single cyl	834.00	279.00	......
Gas, Mod. 200 double cyl	2,064.00	205.00	......
Elec, Mod. 160 single cyl	948.00	295.00	......
Elec, Mod. 200 double cyl	2,175.00	750.00	......
Pumps:			
Centrifugal, gas 2" 7M	58.00	20.00	6.60
Centrifugal, gas 2" 10M	60.25	20.75	6.90
Centrifugal, gas 3" 15M	74.25	25.25	8.30
Centrifugal, gas 4" 30 M	113.00	38.50	12.25
Diaphragm, force or open			
Gas, portable 2" single, to 2 hp	57.75	19.00	6.10
Gas, portable 4" single, to 4½ hp	73.50	25.00	8.45
Rollers:			
2-axle tandum, 3–5 ton gas	321.00	103.00	33.75
2-axle tandum, 8–10 ton gas	549.00	170.00	56.50
2-axle tandum, 10–16 ton gas	707.00	270.00	90.00
3-wheel, 7–10 ton gas	483.00	162.00	52.25
3-wheel, 10–14 ton gas	635.00	216.00	72.50
2-axle tandum, 8–10 ton diesel	594.00	199.00	64.75
2-axle tandum, 10–14 ton diesel	738.00	247.00	80.25
3-wheel, 7–10 ton diesel	563.00	190.00	64.50
Shovels & backhoes, dipper incl:			
Crawler, gas ¾ cy	1,402.00	445.00	136.00
Crawler, gas 1½ cy	2,384.00	724.00	239.00
Crawler, gas 2½ cy	3,657.00	1,184.00	388.00
Crawler, diesel ¾ cy	1,442.00	490.00	159.00
Crawler, diesel 1½ cy	2,522.00	813.00	277.00
Crawler, diesel 2½ cy	4,110.00	1,354.00	457.00
Backhoes, crawler, gas ¾ cy	1,282.00	407.00	134.00
Backhoes, crawler gas 1½ cy	2,263.00	697.00	236.00
Backhoes, crawler diesel ¾ cy	1,413.00	461.00	153.00
Backhoes, crawler diesel 1½ cy	2,666.00	839.00	281.00
Backhoes, truck, gas ½ cy	1,512.00	479.00	155.00
Backhoes, truck, diesel ½ cy	1,827.00	587.00	190.00
Shovel attachments:			
Shovel front, ⅜ cy	194.00	72.35	25.00
Shovel front ½ cy	284.00	92.00	30.50
Shovel front, ¾ cy	374.00	127.00	44.00
Hoe attachment, ⅜ cy	196.00	72.25	25.00
Hoe attachment, ½ cy	284.00	92.00	31.50
Hoe attachment, ¾ cy	359.00	125.00	43.00
Trenching machines:			
Ladder type, gas 8½', 36"	1,176.00	419.00	134.00
Ladder type, diesel 8½', 36"	1,406.00	500.00	171.00
Wheel type, gas 5–6', 24"	941.00	322.00	108.00
Wheel type, diesel 5–6', 24"	1,085.00	351.00	127.00
Vibrators:			
Electric, 18 ft shafting			
⅜–⅝ hp	54.00	18.50	6.25
⅝–1¾ hp	64.25	22.00	7.25
1¾–2¾ hp	69.50	24.00	7.75
Elec, 180-cycle, gen & 1 vibr	142.00	47.50	16.25
Gas, 18 ft shafting up to 1½ hp	67.75	23.00	7.25
Gas, 28 ft shafting 2½–3½ hp	87.25	29.75	10.25
Gas, 28 ft shafting 3½–4½ hp	91.00	31.00	10.25
Welding machines:			
Gas eng driven, to 250 amp	98.25	32.75	9.30
Gas eng driven, 250–350 amp	127.00	43.00	13.00
Gas eng driven, 350–500 amp	148.00	50.25	19.00
Tractors, diesel crawler:			
Gear Drive, w.o. attachments			
26–25 drawbar hp	427.00	140.00	42.75
36–44 drawbar hp	521.00	167.00	55.00
45–59 drawbar hp	672.00	214.00	69.00
60–71 drawbar hp	800.00	260.00	79.00
72–79 drawbar hp	986.00	320.00	103.00
80–95 drawbar hp	1,004.00	327.00	105.00
96–115 drawbar hp	1,313.00	413.00	136.00
116–131 drawbar hp	1,322.00	437.00	138.00
132–150 drawbar hp	1,497.00	488.00	152.00
151–170 drawbar hp	1,967.00	621.00	200.00
201–240 drawbar hp	2,773.00	875.00	275.00
Torque converter, w.o. attachmts			
120–144 drawbar hp	1,465.00	481.00	144.00
145–164 drawbar hp	1,745.00	537.00	178.00
165–185 drawbar hp	1,806.00	585.00	193.00
186–214 drawbar hp	2,116.00	696.00	226.00
251–300 drawbar hp	3,104.00	982.00	301.00
Over 300 drawbar hp	3,900.00	1,300.00	433.00
Bulldozers, for tractor of:			
36–45 hp (drawbar) a	$163.00	$54.50	$18.25
72–79 hp b	240.00	81.00	28.25
132–150 hp c	370.00	118.00	38.50
a 44–55 hp for TC drive			
b 89–100 hp for TC drive			
c 164–185 hp for TC drive			
Tractor loaders:			
Crawler Mounted, 1–1¼ cy	843.00	281.00	84.00
Crawler mounted, 1½–1¾ cy	1,171.00	366.00	117.00
Rubber mounted diesel,			
2-whl drive ¾–1 cy	639.00	211.00	69.00
4-whl drive 1¼–1½ cy	1,153.00	394.00	130.00
Rubber mounted gas,			
2-whl drive ⅝–¾ cy	563.00	185.00	58.25
4-whl drive 1–1¼ cy	876.00	306.00	108.00
Tractors with cable scrapers:			
2-wheel tractor with 2-wheel cable scraper (heaped mass)			
6½ to 11 cy	1,434.00	511.00	156.00
12 to 16 cy	2,171.00	775.00	254.00
14½ to 19 cy	2,546.00	873.00	259.00
19 to 25 cy	3,368.00	109.00	348.00
4-wheel tractor with scraper:			
8½ to 12½ cy	1,175.00	......	......
11 to 15 cy	2,110.00	......	......
15 to 17 cy	2,840.00	......	......
19 to 26 cy	2,952.00	......	......
Graders:			
Diesel, up to 16,500 lb	607.00	199.00	63.25
Diesel, up to 16,501–20,500 lb	790.00	252.00	84.00
Diesel, up to 22,501–26,000 lb	1,061.00	344.00	11.00
Diesel, up to 26,001–30,000 lb	1,210.00	398.00	126.00
Rollers, sheepsfoot, double dr:			
42" diam, 48" length	164.00	57.75	17.75
60" diam 60" length	391.00	135.00	44.00
Rooters:			
Heavy, 7,001–11,000 lb	230.00	72.50	23.50
Scrapers, without power units:			
Heaped mass 7–10 cy	493.00	165.00	51.75
Heaped mass 13½–17 cy	740.00	247.00	76.50
Heaped mass 17–22 cy	983.00	337.00	108.00

Cost to Own Equipment

Assoc. General Contractors of America, Washington, D. C.

FIXED EXPENSE per working month just to own construction equipment is expressed in per cent of cost new in 1956 AGC Manual, Contractors' Equipment Ownership Expense, $1.

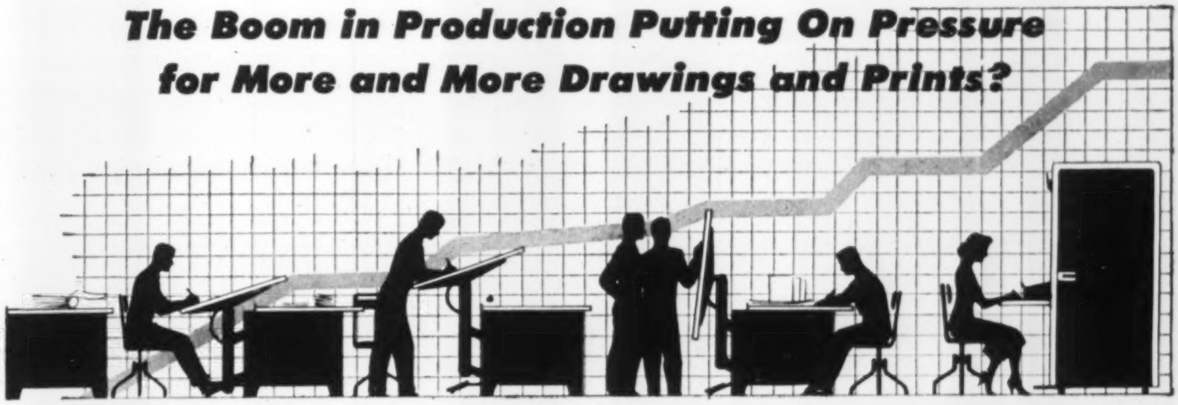
This does not cover cost of field repairs, fuel lubricants or other operating cost. It is not a rental schedule.

It does cover depreciation (D in table below), overhauling, major repairs, painting (OR), interest, taxes, storage, insurance (IT), total ownership expense (Tot), average use in months per year (U) and expense per working month (E/mo).

	— % of capt investment —					
Average annual Ownership Expense	**D %**	**OR %**	**IT %**	**Tot %**	**U mo**	**E/ %**
Air compressor, portable						
gas 60-185cfm; diesel 105-185	25	15	11	51	6	8.5
gas 210-365 cfm; diesel 210-630	20	15	11	46	6	7.7
stationary-electric, 46-160 cf	25	15	11	51	6	8.5
215-590 cf	20	15	11	46	6	7.7
Air tools						
drifter	25	10	11	46	6	7.7
rock drill, 15-80 lbs	33	10	11	54	6	9.0
wagon drill, air or hand hst	14	10	11	35	7	5.0
grinder, concrete surfacing	33	10	11	54	6	9.0
hammers (pvmt break, rivet, sheet driver, calk & chip)	33	10	11	54	6	9.0
hose, ¾"-1"	50	10	11	71	8	8.9
jackhammer	33	10	11	54	6	9.0
sharpener, forge	17	10	11	38	6	6.3
spades, clay	33	10	11	54	6	9.0
tamper, backfill	33	10	11	54	6	9.0
vibrator	33	10	11	54	7	7.7
wrenches, impact, ⅝"-1¾" bolt size capacity	25	10	11	46	6	7.7
Bituminous equipment						
mix plant, batch type						
500-1500 plug mill	20	17	11	48	6	8.0
2000-5000 plug mill	17	17	11	45	6	7.5

Continued on page 198

The Boom in Production Putting On Pressure for More and More Drawings and Prints?



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Two Great New Models for the Large Or Small Engineering Department!

If your company, like most others, is gearing up for greater-than-ever production, it will mean more pressure on your drafting room for engineering drawings and prints. You couldn't pick a better time to get a new modern reproduction machine. And you couldn't make a wiser choice than efficient, trouble-free Copyflex.

In just the last year, Bruning has introduced five new advanced machine models, two of which are shown here. These machines cover the reproduction needs of engineering departments, from the smallest to the largest. They offer you the famous problem-free installation and operation of Copyflex . . . no exhaust venting, no plumbing or auxiliary equipment, no installation other than an electrical connection. They bring you faster reproduction and a host of operator conveniences that will help you boost drafting room output, keep costs at a minimum.

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New Copyflex Model 300. An all-new, low-cost tabletop model offering 30-inch printing width, up to 9 f.p.m. mechanical speed, 110 volt operation. Brings the advantages of "inside" reproduction within the reach of the smallest engineering department. Enables the largest company to supplement, economically, its reproduction center with additional, strategically located model 300's.

New Copyflex Model 500. A new, fast, heavy-volume machine offering top mechanical speed of 40 f.p.m., 46-inch printing width, automatic separation, front or rear delivery, automatic stacking, and a host of other advanced features.

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Company ______
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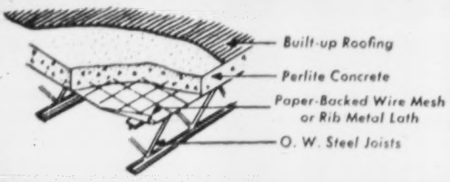
PERLITE

3 WAYS TO SIMPLIFY ROOF DECK DESIGN WITH PERLITE CONCRETE

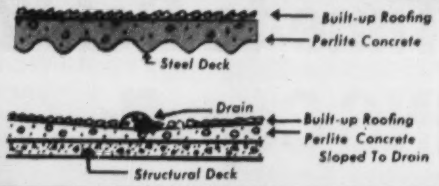
1

Combine light structural deck and insulation.



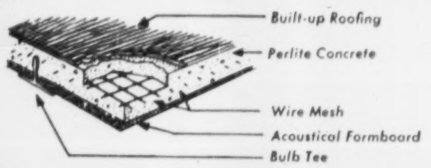
2

Combine insulation and lightweight fill.



3

Combine fire safe insulation and acoustical ceiling.



Stronger and more durable than ordinary insulating materials, perlite concrete can be designed to combine the functions of roof deck and insulation in one monolithic slab. No other insulation material is needed.

Perlite concrete insulation adapts to any roof—curved, flat, pitched—and can't rot, burn or aid the spread of fire. Its use often permits substantial reductions in insurance rates.

Typical Properties:

Mix Ratio	Weight pcf	Compressive Strength, psi	U-Value 2½" slab & roofing
1:4	36	440	0.214
1:6	27	180	0.175

Specify perlite insulating concrete over formboards, metal decks, structural concrete, ribbed metal lath or paper-backed wire mesh. See Sweets or write for specifications: PERLITE INSTITUTE, 45 West 45th Street, New York 36, N. Y.

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We appreciate the exacting, and excel in the unusual.

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Costs to Own Equipment—AGC

Continued from page 196

Average annual Ownership Expense	D %	OR %	IT %	Tot %	U/ mo	E/ %
	— % of capt investment —					
Boiler, vert, 150 psi, 23-175 BHP	14	20	11	45	6	7.5
Bucket, clamshell						
digging, std, 1½-4cy	20	18	11	49	6	8.2
orangepeel, std, 2½-4 cy	20	20	11	51	6	8.5
concrete, bottom dump, ½-4 cy	20	15	11	46	6	7.7
Buckets, dragline						
crane, ½-1 cy	25	15	11	51	6	8.5
1½-2½ cy	20	15	11	46	6	7.7
Buildings, portable	20	15	11	46	8	5.8
Concrete constr equip—						
Concrete batcher, portable						
complete	20	12	11	43	6	7.2
batcher only	25	17	11	53	6	8.8
Bins, steel, portable						
with folding legs	20	15	11	46	6	7.7
knockdown	17	15	11	43	6	7.2
Cart, concrete, pneu, pwr driven, 6-11 cu ft	33	25	11	69	7	9.9
Cement gun machine						
N-00 & N-0, nozz & 50' hose	33	12	11	56	8	7.0
N-1 & N-2, nozz & 50' hose	25	15	11	51	8	6.4
Cement plant, bulk	20	15	11	46	6	7.7
Mixers, concrete						
gas, 3½-S	50	12	11	73	8	9.1
14-S, non-stand	33	12	11	56	8	7.0
28-S	25	12	11	48	8	6.0
elec, 3½-S	30	12	11	53	8	6.6
10-S, non-stand	20	12	11	43	8	5.4
Mixers, paving						
gas	25	15	11	51	6	8.5
diesel	20	15	11	46	6	7.7
Mixers, truck						
body & engine 1 cy	33	12	11	56	8	7.0
2 cy	25	12	11	48	8	6.0
incl truck, 1 cy	33	16	11	60	8	7.5
2 cy	25	16	11	52	8	6.5
Cranes, crawler						
Diesel, 4-ton, 10' rad	25	10	11	46	8	5.8
6 to 12-ton, 10' rad	20	10	11	41	8	5.1
14 to 18-ton, 12' rad	17	10	11	38	7	5.4
Crusher, cone or gyrator	10	12	11	33	6	5.5
Crusher, jaw	17	12	11	40	6	6.7
Dragline, crawler						
Diesel, ½ cy, 35' bm	25	15	11	51	9	5.7
4 cy, 75' bm	15	15	11	41	7	5.9
Electric, ½ cy, 35' bm	20	12	11	43	9	4.8
3 to 3¼ cy, 60' bm	10	12	11	33	7	4.7
Gas, ½ cy, 35' bm	25	15	11	51	9	5.7
1¾ to 2 cy, 50' bm	17	15	11	43	7	6.1
Engine,						
Diesel & clutch, 10-25 hp	15	15	11	41	7	5.9
30-160 hp	12	12	11	35	7	5.0
165-500 hp	10	12	11	33	7	4.7
Gas, under 11 hp	20	15	11	46	7	6.6
35-40 hp	13	15	11	39	7	5.6
41-200 hp	12	12	11	35	7	5.0
Grader, self-propelled	20	15	11	46	8	5.8
Hoist, gas, dbl-drum, 25-100 hp	17	10	11	38	8	4.8
Hose	50	10	11	71	7	10.1
Motor, electric						
squirrel cage, 5-25 hp; and wound, 10-40 hp	10	10	11	31	7	4.4
squirrel cage, 35-250 hp; and wound, 50-250 hp	10	10	11	31	6	5.2
Pumps, portable						
centr gas, 1½-10"	20	18	11	49	6	8.2
elec, ¾-8"	17	15	11	43	6	7.2
diaphr gas, 3-4"	20	20	11	51	6	8.5
elec, 3-4"	17	15	11	43	6	7.2
Rollers, road						
two-axle tandem, dies. or gas	14	12	11	37	8	4.6
Rollers, tamping						
Sheepsfoot, 4-8'	33	20	11	64	8	8.0
12.5' to 22'	25	15	11	51	8	6.4
Rubber-tired	33	30	11	74	8	9.3
Rope, wire ¾"	40	20	11	71	7	10.1
manila, ¾"	50	20	11	81	7	11.6
Saw, chain						
electric, 18-72" clear cut	33	15	11	59	8	7.4
gas, 18-84" clear cut	33	15	11	59	8	7.4
Saw, hand electric, 4-13"	33	10	11	54	8	6.8
Scraper, self-loading						
pneu, 4-36 cy struck cap	20	15	11	46	8	5.8
Shovel, crawler						
diesel, ⅜ cy	27	15	11	53	9	5.9
½ cy	25	15	11	51	9	5.7
3½ cy	14	15	11	40	7.5	5.3
electric, ½ cy	20	12	11	43	9	4.8
2½-5 cy	10	12	11	33	8	4.1
gas, ⅜ cy	27	15	11	53	9	5.9
½ cy	25	15	11	51	9	5.7
1¾-2½ cy	17	15	11	43	8	5.4
Shovel attachments						
crane, ½ to 1½ cy	25	10	11	46	8	5.8
ditcher, ½ to 1½ cy	25	10	11	46	8	5.8
dragline, less bucket						
¾ cy	25	10	11	46	8	5.8
1¼ to 1¾ cy	25	10	11	46	7	6.6
shovel, ½ to ¾ cy	25	10	11	46	9	5.1
1¾ to 2½ cy	25	10	11	46	8	5.8
Tractor, crawler						
diesel, 20- 52 drwbr hp	25	15	11	51	9	5.7
53-135 drwbr hp	20	15	11	46	8	5.8
gas, 20- 32 drwbr hp	33	15	11	59	9	6.6
67-105 drwbr hp	20	15	11	46	8	5.8
2-wheel, rubber tired, 80-240 brake hp	20	15	11	46	8	5.8
Tractor attachments						
bulldozer, up to 42 hp	33	20	11	64	8	8.0
90-163 hp	20	15	11	46	8	5.8

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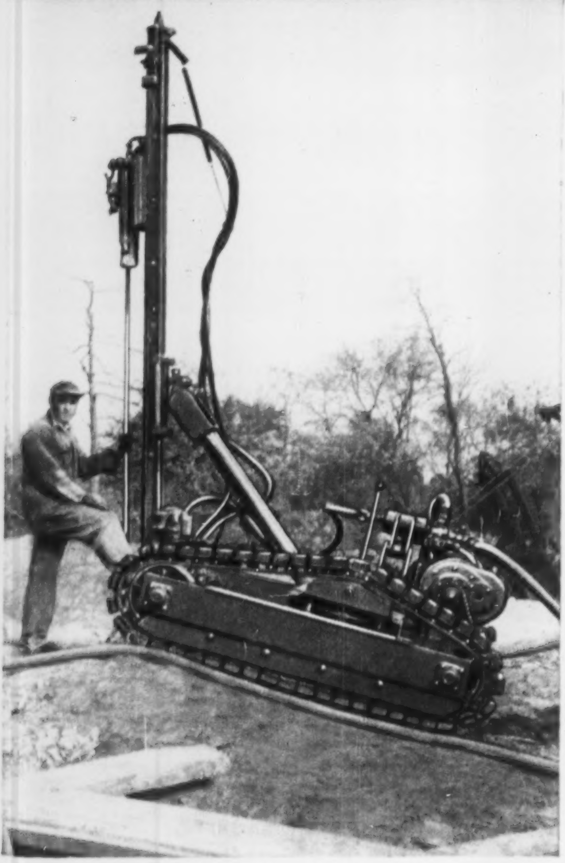
NEW THOR SELF-PROPELLED ONE-MAN DRILLCAT

First on-the-job reports prove Drillcat delivers more work, bigger profits, in less time



DRILLING DOWN HOLES. Two 7½ h.p. air motors propel this compact (6 ft. 9 in. overall) Thor Drillcat where no other crawler can go. More than enough power to pull its own air supply. Drilling down holes is no chore for Thor's Drillcat. Using the powerful model 105M drifter and chain feed mast, the hydraulic accumulator keeps boom rigid at all times. This means less steel breakage and less wear on chuck parts.

Check this proof direct from the job!

PAID FOR ITSELF IN ONE JOB

A net profit of $15,000 in one week on rock drilling jobs was reported by one contractor—another, equipped with five Thor Drillcats paid for them in three months from extra profits.

OUTPERFORMS 3 WAGON DRILLS

Three operators and two helpers running three Drillcats outperformed nine men operating three wagon drills by backing full equipment from drilling face for shot in only two minutes. Wagon drill crews required one-half an hour.

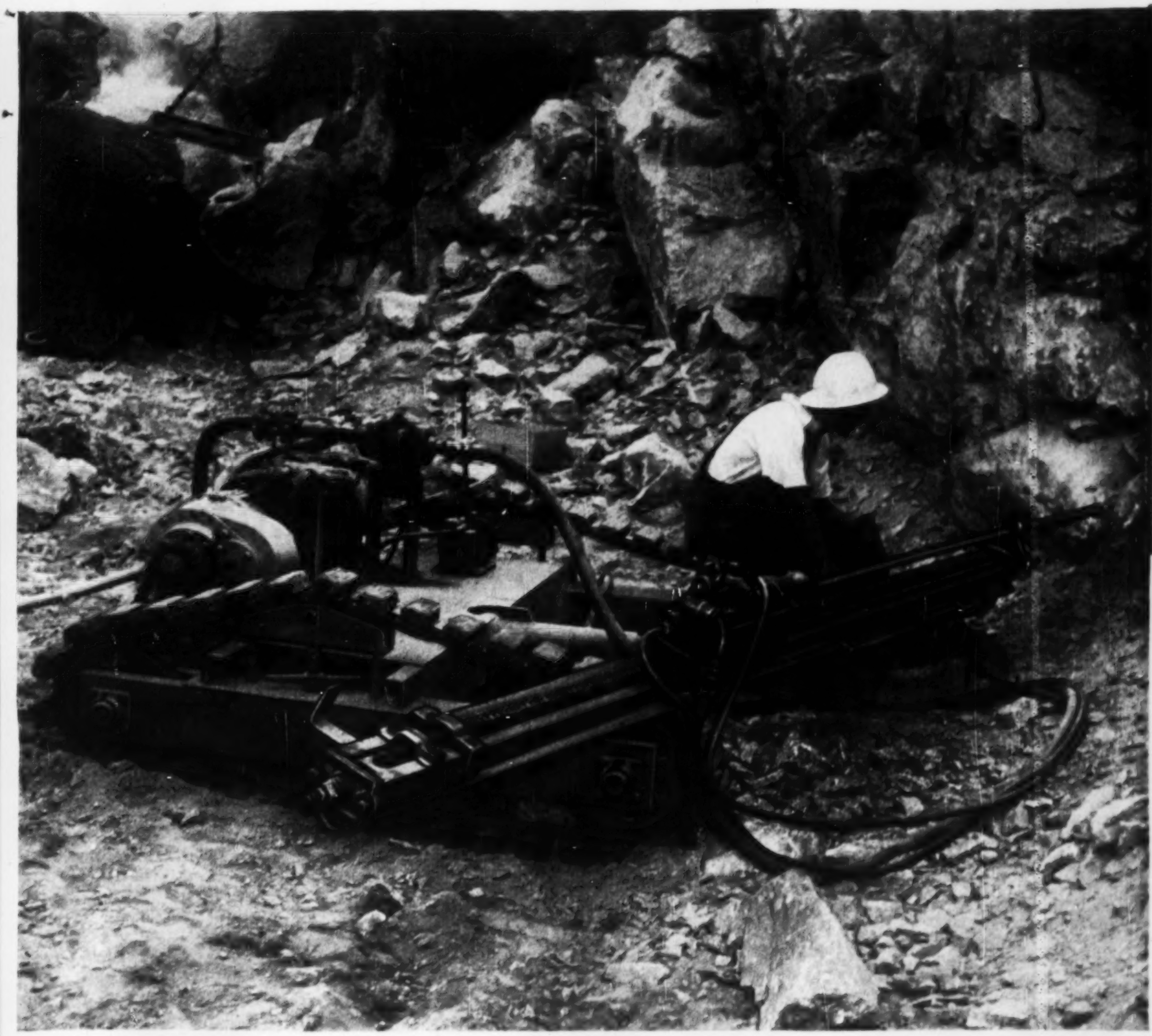
SAVES OVER 2½ HOURS SET-UP TIME

You can set a Thor Drillcat in drilling position—ready to go—in 20 to 25 minutes. 2 to 3 hours is required for the same set-up using wagon drills.

FAST WHEN THE GOING IS TOUGHEST

One man on a Drillcat tugged a 600 c.f.m. air compressor ½ mile over rough terrain, drilled five holes and was back with equipment at his starting point in only two hours.

We want to prove this performance to you! Ask any Thor distributor for a Drillcat demonstration and you'll know why nine out of ten Thor Drillcats stay on the job after the first demonstration.



DRILLING TOE HOLES. The Thor Drillcat is completely flexible. The boom and mast are lowered flat to the ground for toe hole and lifter holes. Twin reversible drive air motors permit easy maneuvering to any position, any angle. (Note position of controls for easy operation.) A "dead man" control for all air valves is standard equipment on the Drillcat.

These exclusive features make Thor model MM-2 Drillcat the most productive rock-drill you can buy!

● Thor's super-powered 105M drifter rock drill. ● Rugged Thor BW-2 wagon drill mast and air control motor. ● Self-propelled with two 7½ h.p. Eimco air motors, power aplenty to haul itself and air supply. ● Rigid frame, proved in tractor design, no moving or wearing parts, long lasting, low maintenance. ● Aircraft-type accumulator in hydraulic system absorbs shock. ● Simple hand-operated track take-up. No tools required. No track locks required. ● Large flat platform. Ideal for operator when drilling toe holes. Good for tool and fuel storage.

Thor
PORTABLE POWER
TOOLS

THOR POWER TOOL COMPANY, Aurora, Illinois
Branches in all principal cities

Two Tramrail archbeam tracks, located between the sets of triple arches, run the entire length of this concrete bridge.

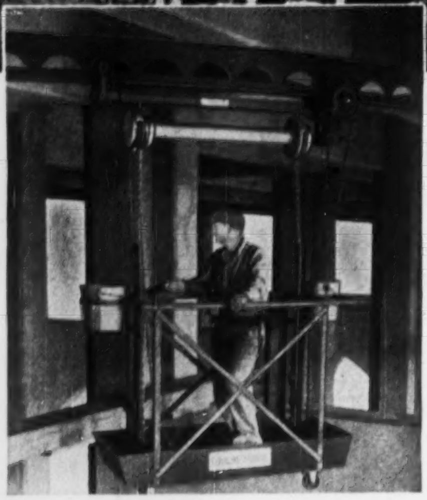
Traveling Platform *Facilitates* Bridge Inspection

THE Penn-Lincoln Parkway Commercial Street Bridge, Pittsburgh, Pa., has been equipped with a Cleveland Tramrail system so that periodic inspection can be made to determine the condition of the bridge.

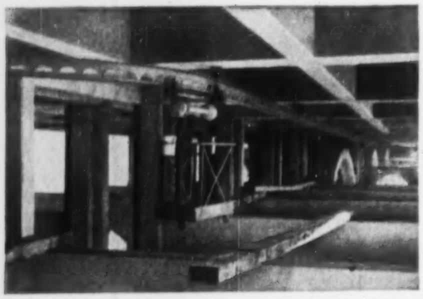
The system, which has two archbeam tracks running the entire length of the bridge, is provided with a hand-propelled traveling platform and hoist, making it possible to get close to all sections underneath, which otherwise would be difficult to reach.

Serious damage has been done to many bridges because of defects which have gone unnoticed. Cost of maintenance is reduced considerably if cracks in floor slabs and concrete pillars are discovered and repaired as they first begin to appear.

It is also important that close watch be kept of all-steel bridges and the Tramrail inspection equipment is not only a convenient, easy means of aiding this work, but is also a big help in making the repairs as well as for painting.



Close-up inspection can be made quickly, safely and easily with this Cleveland Tramrail inspection unit.



The platform not only travels from end to end underneath the bridge, but it can be lowered between any pair of arches.

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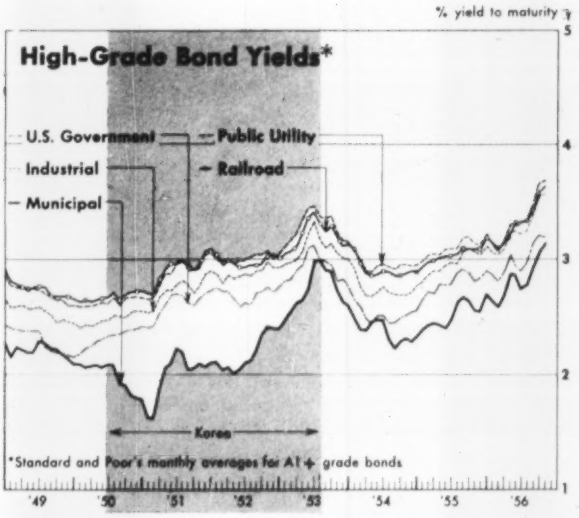

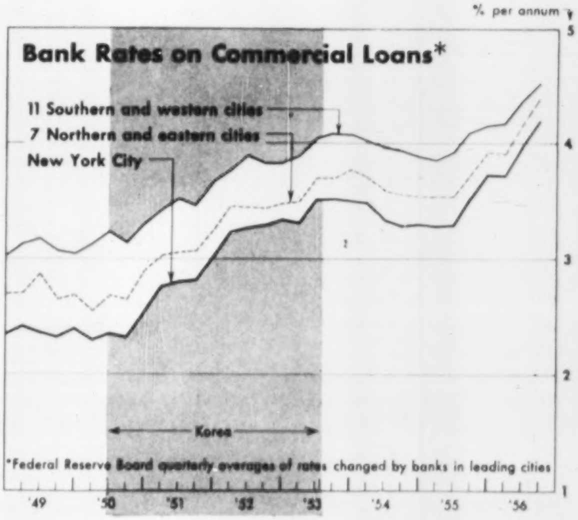

Cost of Money to Rise Again

The money market will continue tight throughout most of 1957 and borrowing will be more expensive.

Demand for capital will continue to grow faster than the supply of loanable funds. The Federal Reserve System, which can influence the supply of credit in a number of ways, seems certain to continue its present restrictive policy as long as the economy continues to boom.

Fearful of a runaway inflation if all borrowers could get all the money they wanted in 1956, the Federal Reserve pulled up hard on the reins several times through increases in the discount rate.

The Fed also resisted the sometimes highly-vocal appeals of some business groups (notably automobile manufacturers and homebuilders) to make more money available.

While demand for capital soared (see accompanying charts), the supply did not. The nation's supply of money has increased just over 1% in the past year. This contrasts with a rise of more than 3% in 1955 and nearly 4.5% in 1954.

Industry, which borrowed enormous sums in 1956 for new plant and equipment, will dominate the money market again in 1957. Bankers agree that some companies will not be able to get the money they want for enlarged construction programs.

All "urgent" industrial projects proposed by strong companies will get the capital needed. Some projects that can be deferred for a year or more may be taken out of the 1957 construction programs.

Major corporations are not likely to be affected either by the cost of money in 1957 or by its availability. Interest rates are going higher. But as long as the 52% corporate tax is on the books, companies will be paying a nominal interest rate of 5%—and an actual interest rate of less than 3%.

There may, however, be a significant shift in the way that industry borrows money to finance its plant and equipment programs. Firms that have relied heavily on bank loans in the past two years may be forced to shift to equity financing to a greater degree.

One construction group may find it easier to get money in 1957. Pressure has been building up for Congressional action to help homebuilding. Most likely course of action in the new Congress would be a change in the interest rates on home loans insured by the Federal Housing Administration and the Veterans Administration. Both currently are pegged at 4½%.

Some groups, including bankers, realtors and leading homebuilders, advocate flexible interest rates on FHA and VA mortgages. Under such a plan, a group of key Administration officials would have the option of raising or lowering these interest rates at regular intervals to keep in step with the rest of the money market.

An alternative would be to maintain fixed interest rates on FHA and VA loans but raise the rate to 5%.

Either step would make these mortgages attractive to investors and would enable homebuilding to compete with other borrowers. The effect would be to stimulate housing, at least temporarily. Some such action seems likely in 1957.

Another big construction program that hinges on the money market is Lease-Purchase, under which federal buildings, such as post offices, courthouses and federal office buildings, are built by private enterprise and leased to the government with an option to buy.

Bond Yields—Per Cent

Standard & Poor's

	Govt (1)	U. S. Treas (2)†	Municipal (3)	Industrial (4)	Pub Util (5)	Railroad (6)
1932	....	3.68	4.65	5.58	5.04	5.37
1933	....	3.31	4.71	4.98	4.69	4.54
1934	....	3.12	4.03	4.28	4.19	4.01
1935	....	2.79	3.40	3.73	3.59	3.58
1936	....	2.69	3.07	3.34	3.38	3.31
1937	....	2.74	3.10	3.16	3.22	3.46
1938	....	2.61	2.91	2.82	2.99	3.60
1939	....	2.41	2.76	2.64	2.83	3.39
1940	....	2.26	2.50	2.57	2.75	3.26
1941		2.05	2.10	2.50	2.69	3.16
1942	2.27	2.09	2.36	2.54	2.71	3.17
1943	2.29	1.98	2.06	2.55	2.64	3.10
1944	2.38	1.92	1.86	2.58	2.64	3.01
1945	2.34	1.66	1.67	2.50	2.59	2.75
1946	2.19	Disc.	1.64	2.44	2.50	2.59
1947	2.24	....	2.01	2.52	2.59	2.62
1948	2.43	....	2.40	2.70	2.83	2.89
1949	2.28	....	2.21	2.53	2.69	2.71
1950	2.32	....	1.98	2.48	2.63	2.66
1951	2.60	....	2.00	2.72	2.89	2.91
1952	2.68	....	2.19	2.87	3.01	2.98
1953	2.90	....	2.72	3.08	3.27	3.19
1954	2.51	....	2.34	2.73	2.95	2.91
1955	**2.80**	....	**2.53**	**2.97**	**3.10**	**3.04**
J	2.65	....	2.39	2.80	2.98	2.92
F	2.71	....	2.42	2.86	3.03	2.97
M	2.70	....	2.45	2.87	3.05	2.99
A	2.77	....	2.43	2.89	3.04	3.01
M	2.76	....	2.41	2.94	3.09	3.02
J	2.77	....	2.48	2.97	3.10	3.02
J	2.87	....	2.62	2.96	3.10	3.05
A	2.91	....	2.67	3.06	3.18	3.08
S	2.88	....	2.63	3.08	3.19	3.08
O	2.82	....	2.56	3.06	3.13	3.08
N	2.84	....	2.55	3.04	3.12	3.08
D	2.89	....	2.71	3.11	3.19	3.18
1956						
J	2.87	....	2.64	3.05	3.13	3.14
F	2.81	....	2.58	3.04	3.07	3.09
M	2.90	....	2.69	3.09	3.15	3.10
A	3.05	....	2.88	3.23	3.29	3.19
M	2.94	....	2.86	3.22	3.29	3.31
J	2.90	....	2.75	3.23	3.31	3.32
J	2.97	....	2.78	3.23	3.34	3.33
A	3.15	....	2.94	3.38	3.47	3.41
S	3.21	....	3.07	3.55	3.66	3.57
O	3.20	....	3.14	3.57	3.69	3.64

(1) aver. taxable long-term government bonds to replace the long-term Treasury bond series discontinued after December, 1945.
(2) aver. partially tax exempt long-term Treasury bonds, not due or callable for fifteen years. †Federal Reserve Bulletin
(3) aver. 15 high-grade long-term municipals.
(4) aver. A1+ industrials.
(5) aver. A1+ public utilities.
(6) aver. A1+ railroads.

(Continued on page 204)

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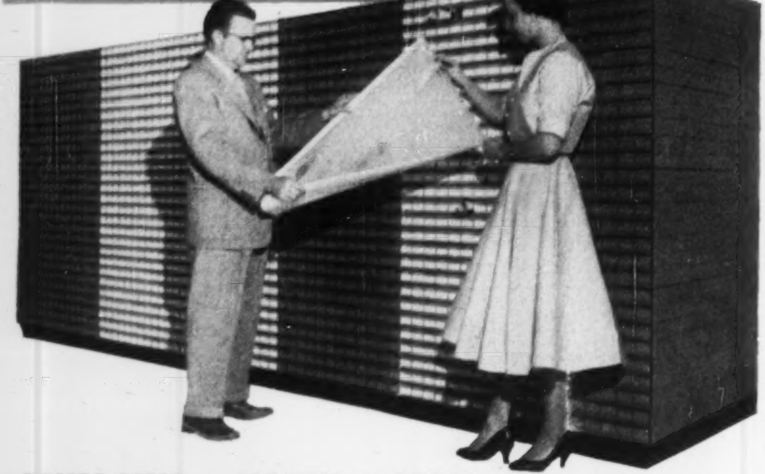

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SAVES TIME . . . puts important drawings at your fingertips

Now you can locate important tracings and drawings quickly and easily—without taking time to refer to a complicated file card system. With the Inter-Lock File each drawing is individually indexed right on the file door. A simple color coding system, visible right on the file door, helps you select the right file at a glance. Funnel-shaped front makes it easy to remove drawings.

SAVES SPACE . . . file more drawings in less space

Compact Inter-Lock Files can be used virtually anywhere—around existing files, in odd storage space, even stacked to the ceiling. No shelves or drawers are required, and there is no waste space. Can be added to as needed.

SAVES MONEY . . . keeps drawings in perfect condition

Drawings are completely protected from dust, light, and crushing; files are fire-resistant, too.

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The government, through General Services Administration and the Post Office Department, takes bids on the construction and financing of these projects. But, the law fixes the maximum interest rate at 4%—a rate too low to compete with other investments in the current market.

Unless Congress agrees to boost the interest rate, the entire Lease-Purchase program may go out the window. In that case, these federal buildings would be financed through appropriations. And, a budget-minded Administration might cut these construction programs substantially.

The homebuilders' plight was well-publicized in 1956; but the effect of tight money on states and municipalities was equally important. The municipal bond market was weak throughout most of the second half of the year. In late November, municipal bond prices had fallen to the lowest levels since September 1939, when war broke out in Europe.

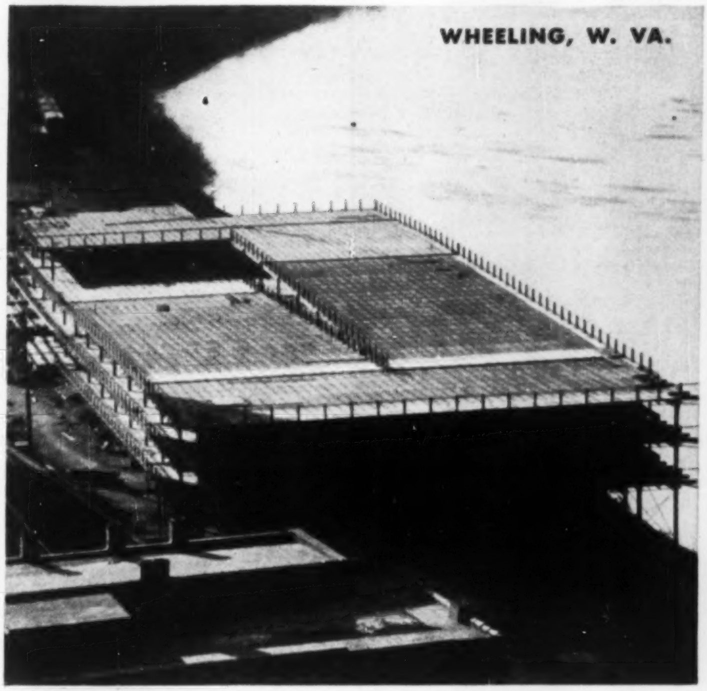
Yields on tax exempt bonds have been high. But many issues failed to attract investors. Bond houses again and again resorted to "distress" prices to sell bonds issued by well-respected cities and authorities. This, in turn, made it expensive and difficult for local governments to borrow for their public works programs, and forced many to defer needed construction. This trend, too, seems likely to continue in 1957.

Finally, contractors will feel the direct effects of higher interest rates next year. Short-term borrowing, for working capital, will be expensive; banks will be more choosy in granting loans.

This could have serious ramifications for roadbuilders, especially. As the expanded federal-aid highway program shifts into high gear, the volume of work available to highway contractors will be much greater than normal. This offers an opportunity to smaller roadbuilders to move into a larger size bracket—if they can obtain enough working capital to permit rapid growth.

The expected continued rise in the cost of borrowing money probably will be translated into higher price tags for the new highway program. Roadbuilders will have to allow for higher financing costs when they prepare their bids. It is too early to tell yet, however, precisely how much the cost of the new road program will be boosted by progressively higher interest rates. And, even with higher rates, some contractors still will have trouble borrowing.

However, there will be enough money available to keep the economy rolling along at its record clip. And, while the cost of money in 1957 probably will cause some projects to be deferred, the needs remain; helping to build a bigger backlog for the future.



326,000 sq. ft. of Cofar on 6′ 6″ spans were used on the Parkade, a new parking deck and office building.

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229,000 sq. ft. of high-strength Cofar steel units on Wheeling's Wharf Municipal Parking Deck. 3½-inch concrete slabs—on spans of 6′ 9″—were used on this job.

62,000 sq. ft. of Cofar forms and reinforces 3½″ concrete floor slabs in City Hall Realty Parking Deck.

Cofar® concrete slabs make parking decks pay off sooner

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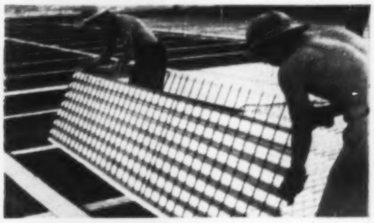

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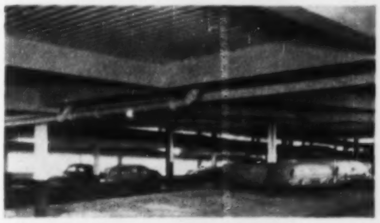

Attractive ceiling. In parking decks, exposed Cofar steel units may be painted for a light-reflective finished ceiling.

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For more information, estimates or costs on your building plan, consult your nearest Granco district office or write to the Granco home office, Dept. E67, 6506 N. Broadway, St. Louis 15, Mo.

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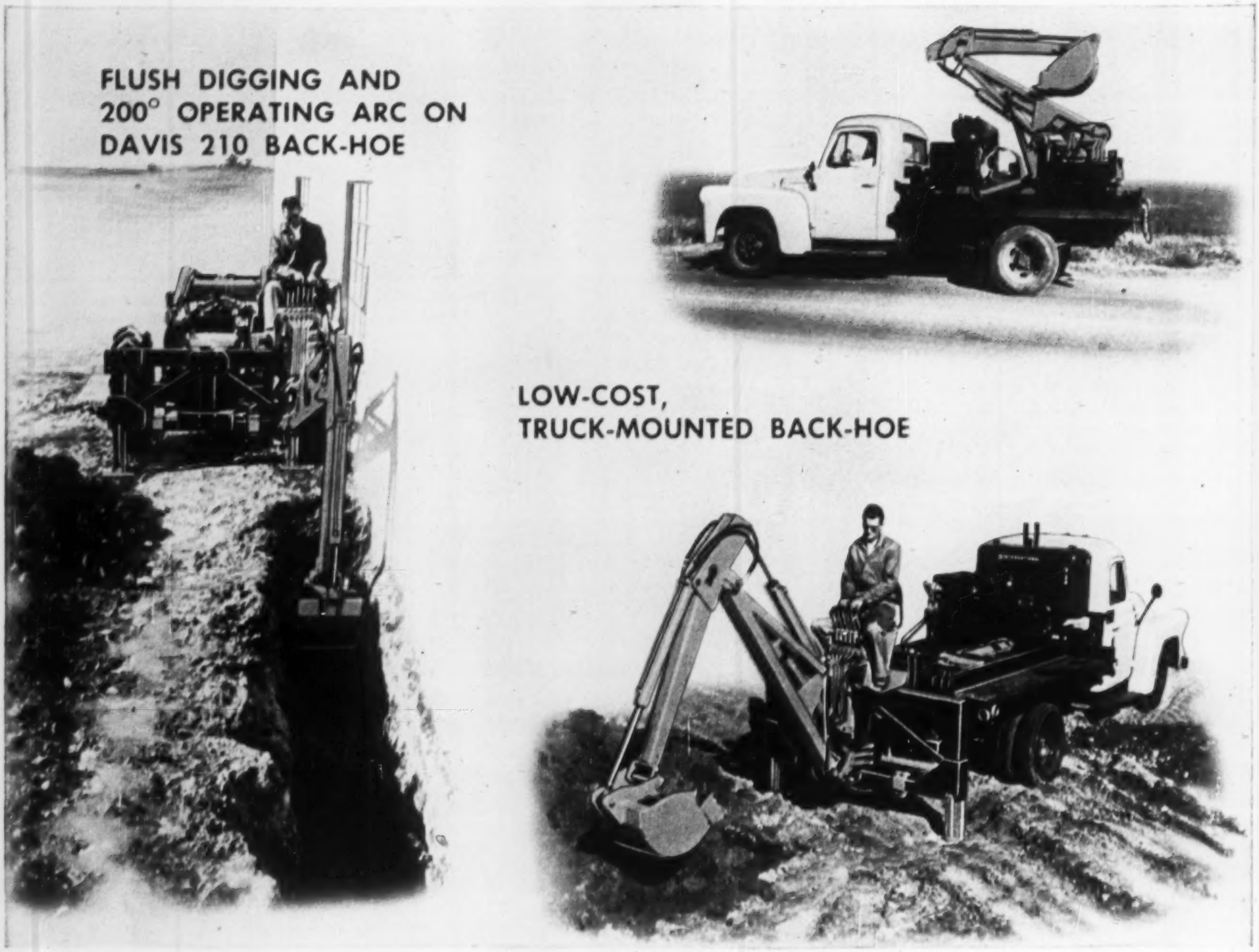

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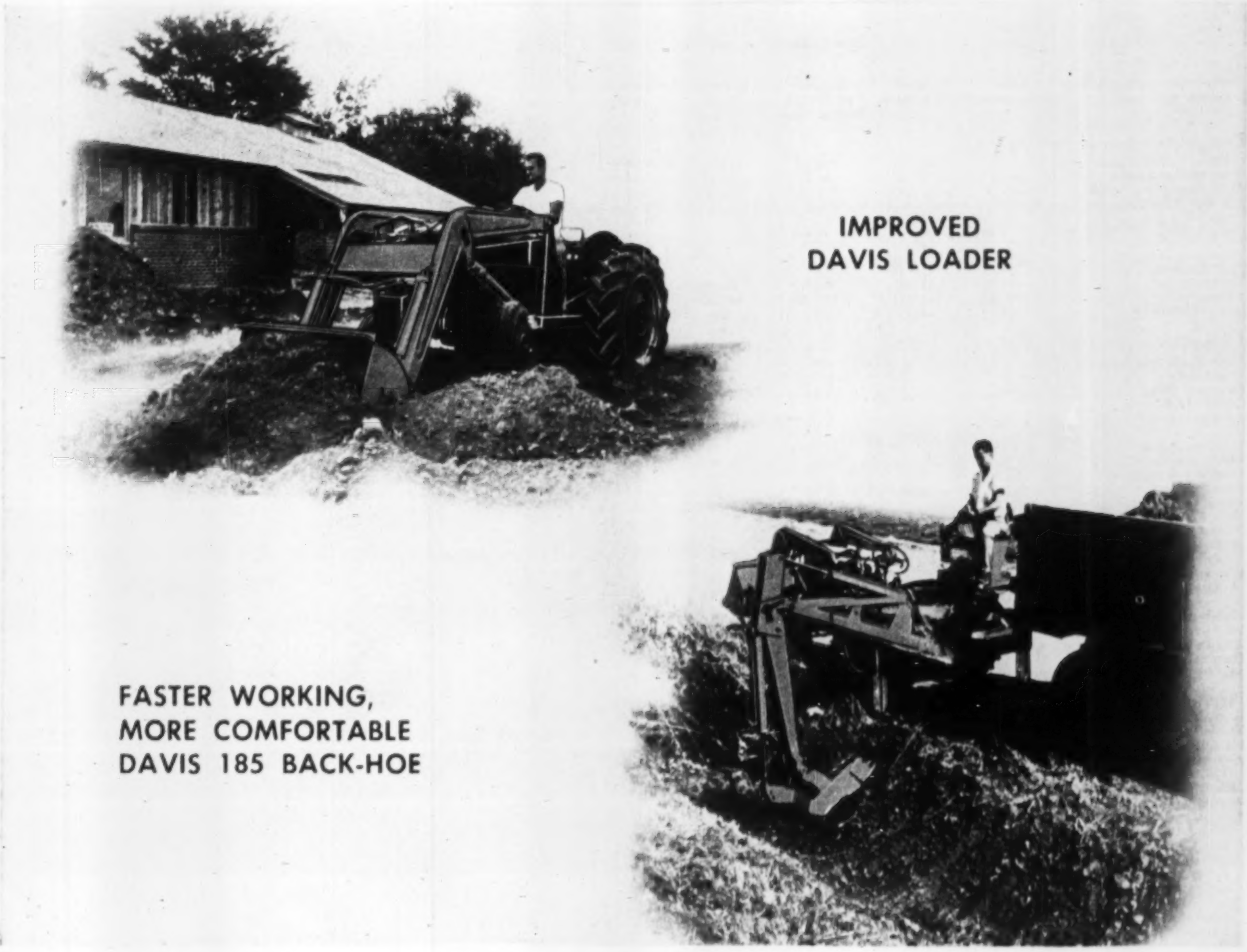

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Where the Building Dollar Goes: Fifth Report

	Masonic Temple	Office Buildings			School	High School	Hospital	Hosp N Home & Heat Plant	Serv Center & Garage	Laboratory
Type of building										
type of construction, frame outside walls	Steel Bk & Limestone	Steel Bk & Stone	Concrete 1st Fl Bk & Balance Metal	Concrete Brick	Concrete Brick	Steel Brick	Conc Skeleton Brick	Reinf Conc Brick	Reinf Conc	Steel Conc a Limestone & Bk Back-up
Costs of this type of building										
per sq ft of floor area		$15.31	$14.79	$11.30	$15.15	$13.62	$22.22	$16.80	$5.44	$28.00
per cu ft of volume	$0.71	$1.39	$1.21	$0.91	$1.24	$0.735	$1.75	$1.50	$0.66	$2.30
Date construction started	8-19-54	10-1-55	1-1-56	11-1-54	6-1-55	1-1-56	5-1-54	Feb 54	Aug 55	July 54
Location of building	Harrisburg Pa.	Harrisburg Pa.	Chicago, Ill.	Chicago, Ill.	Chicago, Ill.	Mechanicsburg, Pa.	Fond du Lac, Wisc.	Washington, D.C.	Washington, D.C.	Pittsburgh, Pa.
% of Total										
Height, stories	2	2	4	4	3	2	8 & B	8, 3 & 6	5	5
Floor area, sq ft	....	10,000	94,220	96,000	52,400	80,800	135,000	372,744	55,227	85,546
Volume, cu ft	1,800,000	110,000	1,153,600	1,191,000	638,000	1,496,000	1,710,000	4,181,551	453,240	1,046,729
% air conditioned	100	100	90	90	......	......	20	98	......	......
Principal Items of Cost										
Excav & site improvements	4.00 b	3.80 b	1.69	1.82	1.99	3.55 b	2.26	1.71	6.50	5.73
Foundations	11.00 c	5.00 c	3.72	4.09	4.55	10.45 c	1.90	19.70 n	72.30 n	6.86
Structural frame	12.00	10.45	10.85	16.87	13.54	11.45	13.05			11.45
Cement finish work	....	....	1.00	1.24	0.53		0.85	....	....	6.46
Exterior masonry	11.50 d	10.75 d	1.10	5.67	9.71	17.15 d	4.51	11.90 o	3.28 o	14.07
Metal wall panels	....	....	1.90	....	....		....	....	....	....
Interior partitions	0.10 e	3.70 e	4.79	5.56	7.32	1.35 e	8.67	.... o	.... o	4.30
Carpentry & millwork	3.30	5.65	1.31	2.13	5.37	6.10	1.19	3.45	0.20	0.91
Sash & glazing	0.70	5.00	3.25	1.88	5.03	2.45	3.20	2.60	4.69	3.43
Doors	....	....	0.60	0.38	0.27	....	1.06	2.28	....	0.59
Precast roof deck	2.40	....	....	....	....	3.00	....	....	....	....
Roofing	1.50	2.40	0.87	0.94	1.35	1.90	0.42 f	1.10	0.26	0.55
Insulation									....	0.23
Waterproofing & dampproofing	0.30	....	....	....	....	....	0.09	0.18	....	0.70
Metal lath, furring & plaster	4.70	5.45	6.45	2.58	1.64	3.90	3.14	3.20	....	1.10
Hollow metal work	2.50	2.70	0.20	0.25	0.24	1.30	1.25	0.22	0.84	0.58
Misc iron & ornamental metal	2.50	3.60	2.62	1.50	2.12	2.40	0.47	2.67	....	2.18
Tile, terrazzo & marble	1.50	1.30	0.30	0.25	3.94	2.00	7.67	4.40	0.57	0.47
Floor covering	0.50	0.80	1.17	....	1.49	0.70	0.43 g	0.48	0.04	0.36
Painting	1.50 h	1.30 h	0.57	0.63	1.15	1.25 h	1.56	1.34	0.70	1.11
Finish hardware	1.50	....	0.32	0.58	1.13	1.30	1.33	1.14	0.16	0.82
Acoustical ceilings	0.30	1.85	8.95	5.80	4.81	1.55	1.82	0.72	0.17	0.32
Plumbing	5.30	6.45	4.88	4.59	8.17	4.70	9.43	7.20	6.51	8.51
Heat, ventil & air cond	16.50	22.30	17.34	16.84	6.52	11.10	11.38	18.00		12.94
Elec work & light fixtures	7.50	7.50	10.24	10.50	8.04	8.30	12.52	7.11 q	3.78	11.47
Elevators	1.10	....	4.83 i	5.75 i	....	....	3.78	.... p	....	2.25
Moving stairs	....	....	....	....	....	....	....	....	....	....
Spec serv equipment:										
Chalkboards	....	....	....	....	....	0.35	....	....	....	....
Lockers	....	....	....	....	....	0.85	....	....	....	....
Gym equip & bleachers	....	....	....	....	....	1.40	....	....	....	....
Refrig & kitchen equipment	4.00	....	1.06	0.60	....	1.50	....	....	....	0.64 j
Auditorium seats	2.00	....	....	....	....	....	....	....	....	
Stage equipment	1.80	....	....	....	....	....	....	....	....	....
Intercom syst & television	....	....	....	....	....	....	....	.... q	....	0.40
Power plant	....	....	....	....	....	....	0.93	....	....	....
Special equipment	....	....	1.00 k	....	....	....	5.81 l	9.40 r	....	1.39
X-ray protection	....	....	....	....	....	....	1.27	....	....	....
Lightning protection	....	....	....	....	....	....	0.01	....	....	....
Paving	.... b	.... b	1.22	0.72	....	.... b	....	1.20	....	0.18
General work	....	....	7.77	8.83	11.09	....	....	....	....	....

•a ... Fireproofed with concrete •b ... Includes paving •c ... Includes concrete work •d ... Includes interior masonry •e ... Movable partitions •f ... Includes sheet metal •g ... Resilient floor covering •h ... Includes wall covering •i ... Includes dumbwaiter •j ... Includes no kitchen equipment •k ... Pipe covering •l ... Hospital casework & special equipment •m ... Seismograph and X-ray •n ... Foundations & structural frame include all concrete work •o ... Includes interior partitions •p ... Separate contract •q ... Included in electrical work •r ... Hospital, kitchen & laundry equipment

This fifth report on "where the Building Dollar Goes" covers three office buildings, two schools, 2 hospitals, a laboratory, a service center and garage and a Masonic temple.

The temple and one office building are 100% air conditioned, the other two office buildings are 90% and one hospital is 98% and the other is 20% air conditioned. Heating, ventilating and air conditioning takes 16.5% and 22.3% of the construction dollar on the two 100 percenters and 17.34% and 16.84% on the 90 percenters, only 11.38% of the hospital dollars. School heating, no air conditioning, accounts for 6.52% and 11.10% of the school dollars.

The office buildings range from $11.30 per sq ft to $15.31, the schools from $13.62 to $15.15. The Washington hospital costs $16.80 without elevators, the Wisconsin hospital costs $22.22 and the laboratory, $28.00.

Cube costs start at $0.66 for the service-center and garage; are $0.71 for the Masonic temple; range from $0.735 to $1.24 for the schools; from $0.91 to $1.39 for the office building; and go up to $1.75 and $2.30 for the Wisconsin hospital and the laboratory.

The Wisconsin hospital, 8 stories and basement, includes its own power plant which accounts for 0.93% of its cost.

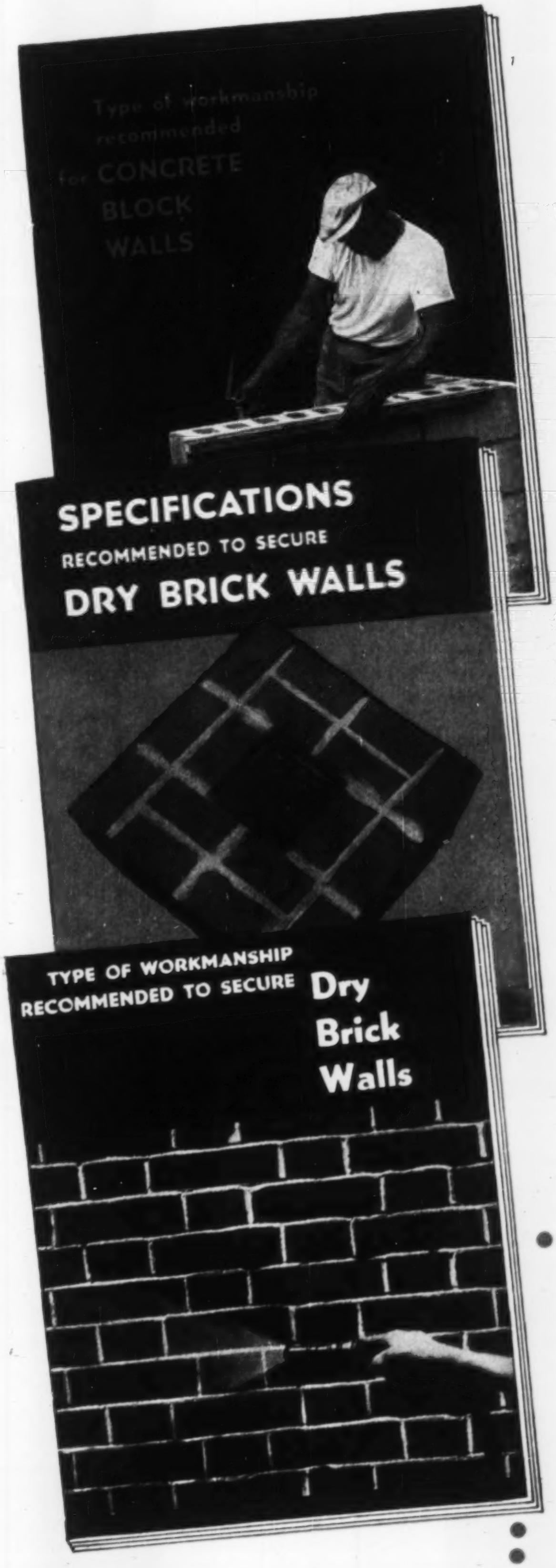
Hospital casework and special equipment take 5.81%, X-Ray protection accounts for 1.27% and lightning protection for 1%.

The big items are structural frame 13.05%, electrical work 12.52%, heating and airconditioning 11.38%, plumbing 9.43%, interior partitions 8.67%, floors 7.67% for surfacing and 0.43% for resilient covering. Elevators take 3.78%.

Of the Masonic temple costs, 4% goes for refrigeration and kitchen equipment, 2% for auditorium seats, 1.8% for stage equipment. Elevators take 1%.

The laboratory costs in Pittsburgh include 1.39% for seismograph and X-Ray equipment, 0.64% for refrigeration and for auditorium seats, 0.40% for intercommunication systems, 0.18% for paving.

These cost analyses are available through the courtesy of H. B. Alexander & Son, Inc., Harrisburg, Pa., W. E. O'Neil Construction Company, Chicago, Ill., Hutter Construction Company, Fond du Lac, Wisconsin and The Trimble Company, Pittsburg, Pa., Charles H. Tompkins Co., Washington, D. C.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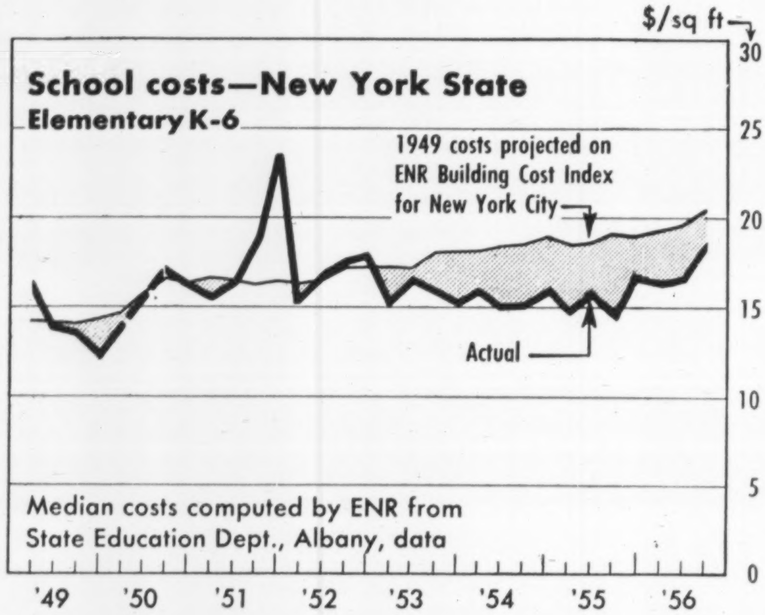


School Costs Per Square Foot in New York State

State Education Department, Division of School Buildings and Grounds

	No. of Schools K-6	Elementary, K-6 — Dollars per sq ft for schools with . . .									No. of Schools 7-12	Secondary, 7-12 Dollars per sq ft		
		One Large Unit*			Two Large Units*			Three Large Units*						
	Total	Min	Med	Max	Min	Med	Max	Min	Med	Max	Total	Min	Med	Max
1949	29	$10.40	$14.00	$19.20	$12.00	$14.60	$18.70	.....	.....	.....	4	$13.20	$13.55	$16.20
1950	20	10.85	17.00	20.80	13.75	16.66	17.80	.....	.....	.....	4	13.35	13.70	14.40
1951	59	12.30	16.45	25.40	18.70	20.25	22.60	$13.90	$23.60	$29.20	6	15.40	16.97	19.30
1952	57	11.40	16.30	20.20	13.00	17.60	21.10	14.20	18.20	23.30	7	15.00	17.10	19.90
1953	65	10.20	16.05	23.40	13.60	16.15	19.40	11.30	16.30	18.80	12	14.15	16.00	18.80
1954	70	10.00	14.55	20.80	12.80	16.05	21.80	14.80	15.30	18.40	17	13.70	15.60	18.00
1955	52	11.75	16.40	23.60	11.90	15.70	20.25	14.90	14.90	15.90	13	12.55	17.10	18.50
55, Q1	17	13.60	16.40	17.35	12.70	14.53	15.90	.....	14.90	.....	4	12.55	15.15	17.50
Q2	15	11.75	15.83	19.90	11.90	15.70	17.20	.....	.....	.....	3	15.60	17.20	17.30
Q3	8	17.50	18.25	19.90	15.90	16.90	20.25	.....	.....	.....	4	15.30	16.40	18.50
Q4	12	15.50	16.95	23.60	.....	.....	.....	.....	15.90	.....	2	18.25	18.33	18.40
56, Q1	11	14.95	15.10	18.40	14.45	16.80	18.50	.....	.....	.....	2	16.75	18.83	20.90
Q2	14	14.40	16.45	17.85	14.60	17.20	19.00	.....	17.10	.....	2	15.80	16.98	18.15
Q3	5	.....	21.60	.....	18.10	18.90	21.10	.....	16.50	.....	2	15.40	17.25	19.10

* Large Unit includes a general purpose room, gymnasium, auditorium, multi-purpose or other group activity room.

These are costs based on the four contracts—general construction, plumbing, electrical, heating and ventilating. They include built-in features, but no movable furniture or equipment. Some minor site improvement may be included, but no major site work and no land costs.

School Bid Prices Climbing

Contractors bidding on school construction in New York State upped their bids during 1956 to record high prices for elementary and secondary schools.

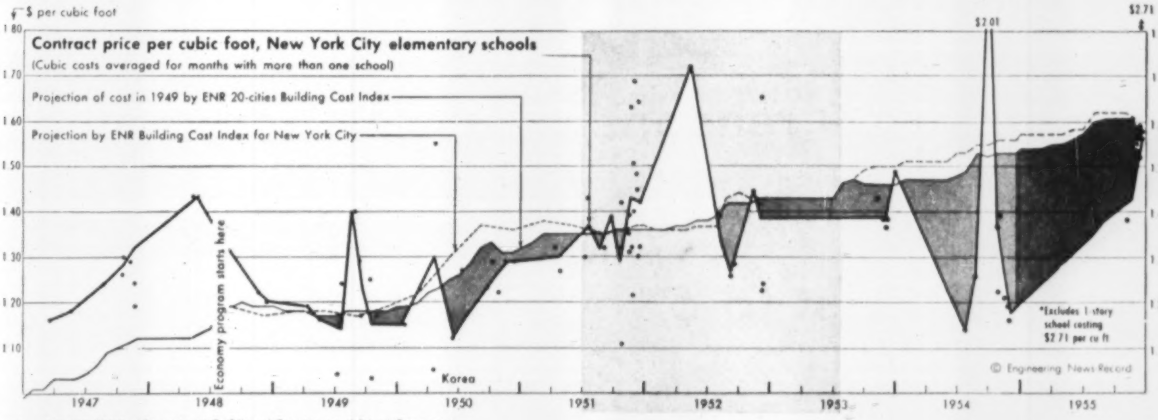
• Bids for elementary—Six schools in the state with a single large unit (gymnasium, auditorium, multipurpose, or other) hit a new median peak of $21.60 per sq ft in the third quarter of 1956. This is 18.4% above the median in the third quarter of 1955.

Prices on secondary schools seesawed during '56. Top bids on secondary schools came during the first quarter when the median soared to $18.83. This was 24.3% above the preceding year's first quarter and a new high. But the next quarter marked a sharp 9.8% drop to $16.98, undercutting the previous year's median bid by 1.3%. Then in the third quarter, bids rose to $17.25 (median) per sq ft, 5.2% above the same period last year.

• In New York City—Contracts let so far in 1956 confirm the same pattern of rising bid prices to new highs. While elementary school prices reached an average of $1.61 per cu ft in 1955, setting a new peak, it is expected that the current year will see this boosted by at least 10%.

Average cost per pupil station moved to $1,653 in 1955, the second highest on record. The preliminary evidence points to an average of about $2,000 for 1956, which will set a new record.

For junior high schools, the same steady upward trend is apparent.



Contract price per cubic foot, New York City elementary schools
(Cubic costs averaged for months with more than one school)
Projection of cost in 1949 by ENR 20-cities Building Cost Index
Projection by ENR Building Cost Index for New York City

Based on data from Board of Education, NYC, Office of Coordination of School Construction

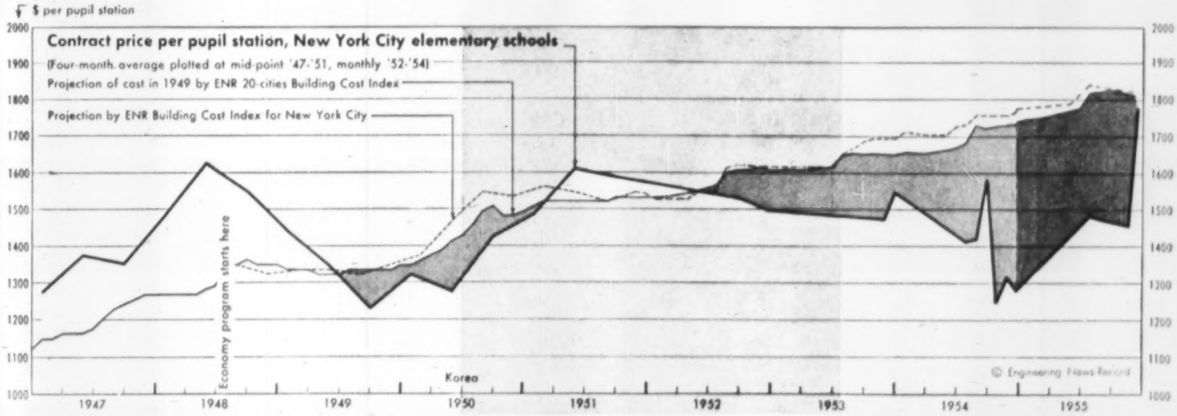
Unit Prices of Schools Built in New York City – by Years

Elementary Schools

	no	per cu ft min	per cu ft aver	per cu ft max	per pupil sta min	per pupil sta aver	per pupil sta max	capacity, pupil stas min	capacity, pupil stas aver	capacity, pupil stas max
1947	(9)	$1.16	$1.25	$1.56	$1,255	$1,517	$1,991	558	1,182	1,550
1948	(5)	1.20	1.30	1.43	1,399	1,581	1,784	806	1,094	1,433
1949	(12)	1.03	1.18	1.40	1,148	1,334	1,638	868	1,181	1,588
1950	(11)	1.04	1.20	1.55	957	1,357	1,612	302	1,036	1,581
1951	(24)	1.11	1.39	1.69	1,447	1,710	2,451	358	885	1,274
1952	(9)	1.23	1.40	1.72	1,391	1,518	1,689	494	969	1,310
1953	(6)	1.37	1.41	1.49	1,202	1,488	1,570	792	944	1,238
1954	(9)	1.14	1.33	2.01	1,216	1,354	1,580	302	1,073	1,292
1955	(10)	1.35	1.61	2.71	1,338	1,653	2,059	133	1,117	1,364

Junior High Schools

	no	per cu ft min	per cu ft aver	per cu ft max	per pupil sta min	per pupil sta aver	per pupil sta max	capacity, pupil stas min	capacity, pupil stas aver	capacity, pupil stas max
1947	(2)	$1.21	$1.23	$1.25	$1,270	$1,277	$1,284	1,810	2,068	2,326
1948	(1)	1.32	1.32	1.32	1,623	1,623	1,623	1,518	1,518	1,518
1949	(3)	0.99	1.09	1.26	1,261	1,380	1,553	1,518	1,819	1,998
1950	(1)	1.07	1.07	1.07	1,210	1,210	1,210	2,012	2,012	2,012
1951	(5)	1.32	1.36	1.38	1,408	1,511	1,645	1,558	1,842	2,020
1952	(7)	1.10	1.22	1.31	1,187	1,342	1,451	1,732	1,813	2,056
1953	(7)	1.10	1.22	1.29	1,176	1,280	1,462	1,766	1,968	2,185
1954	(6)	1.10	1.23	1.30	1,237	1,322	1,517	1,694	1,969	2,136
1955	(11)	1.25	1.44	1.63	1,370	1,580	1,904	1,772	1,950	2,114



Contract price per pupil station, New York City elementary schools
(Four-month average plotted at mid-point '47-'51, monthly '52-'54)
Projection of cost in 1949 by ENR 20-cities Building Cost Index
Projection by ENR Building Cost Index for New York City

School Building Unit Contract Prices, New York City – 1955

Bureau of Construction, Board of Education, City of New York

No.	Size, min-aver-max pupil station	Auditorium gymnasium	Min-aver-max COST per $/pupil station	Min-aver-max COST per $/cubic foot	Min-aver-max % of total bldg contract price* gen'l constr %	heating %	plumbing %	electrical %
Elementary Schools, New 4-Story								
2	1,220	Aud; gym; lnch-plyrm	$1,732-1,755-1,777	$1.56-1.57-1.58	74.1-74.3-74.4	9.5-9.6-9.6	5.0-5.4-5.8	10.2-10.8-11.4
Elementary Schools, New 3-Story								
6	1,706-1,287-1,364	Aud; gym; lnch-plyrm	$1,338-1,486-1,578	$1.35-1.45-1.59	71.7-73.6-74.6	9.2-10.4-10.9	5.1-5.7-6.9	9.5-10.3-11.3
Elementary Schools New 2-Story								
1	872	Aud; gym; lnch-plyrm	$2,047	$1.56	73.7	10.3	5.7	10.3
Elementary School, New 1-Story								
1	133		$2,059	$2.71	74.6	9.7	6.0	9.7
Elementary School Addition, 2-Story								
1	Net gain: 388		$1,083	$1.59	79.9	10.1	4.4	5.6
Junior High School, New 5-Story								
1	1,792	Aud; gym; caf	$1,754	$1.63	72.4	8.6	6.7	12.3
Junior High Schools, New 4-Story								
3	1,893-2,027-2,112	Aud; gym; caf	$1,463-1,503-1,550	$1.40-1.41-1.44	72.2-73.1-73.6	9.3-10.1-10.7	4.9-5.0-5.0	11.1-11.6-12.1
Junior High Schools, New 3-Story								
7	1,772-1,940-2,114	Aud; gym; caf	$1,370-1,589-1,904	$1.25-1.43-1.60	70.7-72.8-75.0	8.7-10.5-11.8	3.2-5.1-6.3	10.3-11.6-12.8
Junior High School Addition, 4-Story								
1		Gym & Moderniz		$1.75	78.8	8.6	4.6	8.0
Vocational High School, New 7-Story								
1 Aviation Trades	#2,390	Aud; gym; caf	$2,629	$1.54	72.1	7.8	5.2	14.9
1 Printing	2,731	Aud; gym; caf	$2,216	$1.49	71.8	8.7	5.4	14.1
High School Additions								
1 5-Story	1,056		$1,556	$1.69	75.1	10.1	4.1	10.7
1 2-Story	2,060		$1,370	$1.36	73.5	11.8	4.4	10.3

Includes 2-story hangar, 135'x200'   *excludes abnormal site costs

Longer tandem life

One of 9 reasons why contractors find International Trucks cost least to own!

In any off-highway truck operation, you need a tandem and other major components built to stand up and take it, to keep costs way down.

And cost records prove* that over the years International Trucks cost *least* to own!

The reason is simply this: It is International policy to build trucks that do the job better, do it longer at lower cost than any other make—International spends more to build the truck so it costs you *least* to own.

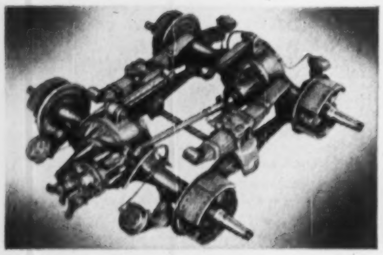
That's why there are more owners of Internationals than any other 6-wheel truck, and have been for the past 21 years!

The way to trim your trucking costs is to get together with your International Dealer, today. He's right at the other end of your phone.

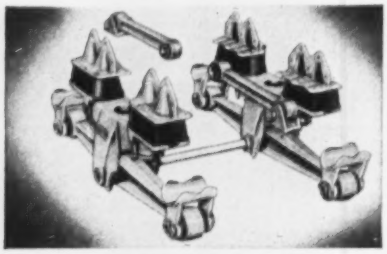
**Signed statements in our files, from fleet operators throughout the U.S., back up this statement.*

International Harvester Company, Chicago

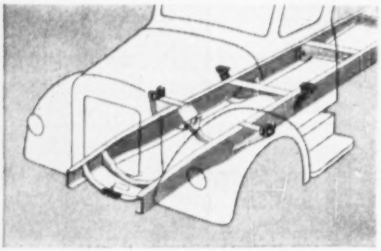
Motor Trucks • Crawler Tractors
Construction Equipment • McCormick®
Farm Equipment and Farmall® Tractors



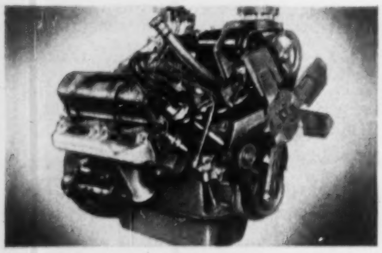
1 **All International tandems** give longer, more dependable life. This unit has rubber bushings at all 10 oscillating points to reduce maintenance and lengthen life. Third differential with lock transmits power smoothly and evenly to each axle.



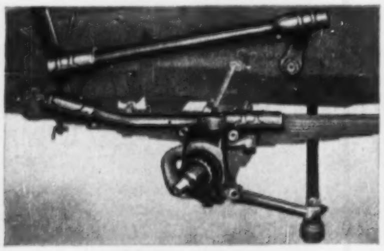
2 **Lightweight suspension** with rubber load cushions provide soft, easy riding, empty and loaded. Cushions reduce truck weight and servicing. Optional aluminum walking beams, spring saddles and wheels increase payloads more than 500 pounds.



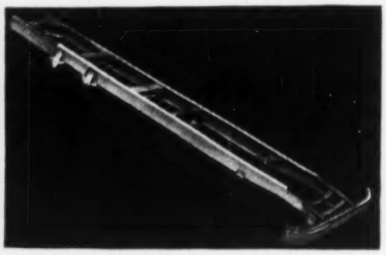
3 **For cab comfort and long life.** Quiet, level ride without transmitting stress to cab, fenders, hood or radiator is the result of wide spaced, rear shackle type mountings in an exclusive International 5-point rubber-insulated V-8 cab suspension.



4 **Most powerful, most economical V-8's** under any truck hood—206, 226 and 257 hp. for faster acceleration and higher average road speeds with less shifting. More miles per gallon of gasoline. Other gasoline, LPG and diesel engines up to 356 hp.

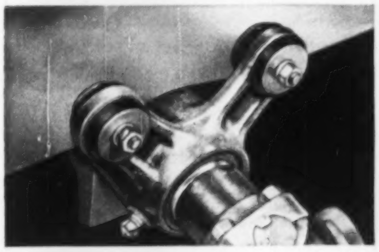


5 **True geometric steering** provides easier handling, outstanding maneuverability with short turning circles. Gears are cam and roller mounted twin lever type. Controls mounted *ahead* of the front axle. Steering wheel is comfortably positioned.

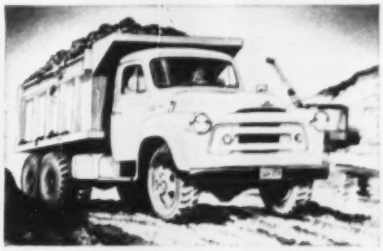


6 **Steel-Flex frames** combine great strength with flexibility. Heavy-duty construction plus reinforced cross-members with husky gussets provide for proper tandem suspension. Inverted L-type reinforcements give full load-length support.

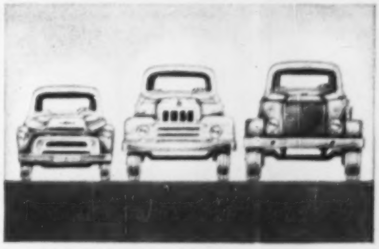
International builds six-wheel models from 22,000 lbs. GVW to 76,800 lbs. GCW in conventional and COE design. There is one practically custom built for your job. Engines range in sizes up to 1091 cu. in.—famous sixes and three great new V-8's. Complete selection of all-wheel-drive models also available to make the toughest going easy. You name the job, International has exactly the right truck for it—the truck that costs you *least* to own.



7 **New "silent spin" center bearings** have quiet, tapered roller bearings. Prelubricated, sealed and shielded for long, trouble-free operation. Self-aligning, wide spaced rubber mountings dampen noise and vibration, eliminate service.



8 **All-wheel-drive** models have the extra traction and pull needed for all tough, off-highway operations. Completely factory-built, 7,000 to 33,000 lbs. GVW. Low height with ample ground clearance. Complete selection of equipment available.



9 **World's most complete line.** There is an International "tailor-made" for every truck job, ½ tonners to 90,000 pounders. Choice of 4-wheel, 6-wheel and all-wheel-drive models, conventional and COE design. Every one built to cost *least* to own.

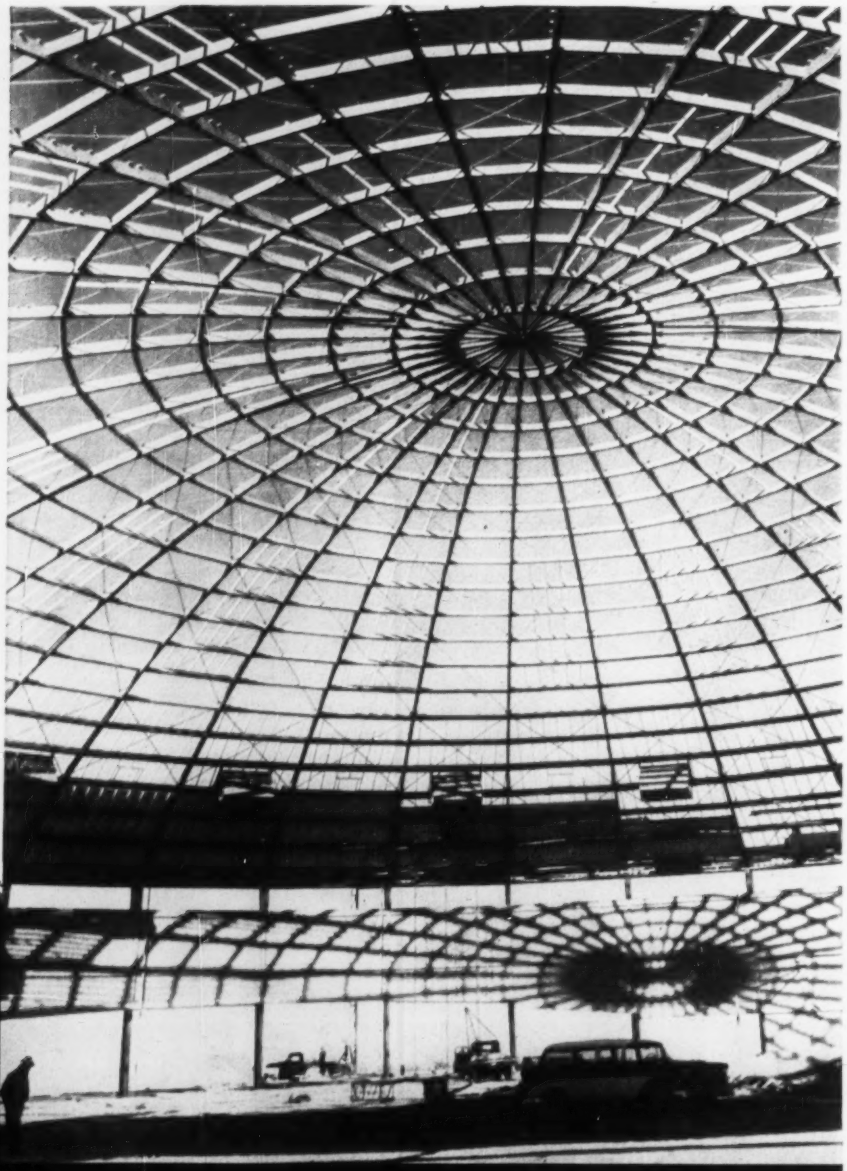
JOB DATA

Architects: Willson & Berg, Bozeman, Montana

Engineer: Ben F. Hurlbutt, Billings, Montana

Contractors: Haggerty & Messmer Company, Bozeman, Montana

- Diameter of dome 300 feet
- Rise of dome 50'-8⅞"
- Seating capacity 12,500
- Number square feet all floors 138,080
- Total cost $1,453,115
- Cost per square foot $11.10
- Cost of dome, per square foot $1.25
- Ventilation: exhausts air in arena every 15 minutes when filled to capacity.
- Heating: American Blower fan units heated by steam from existing power plant.
- Arena Floor: earth with portable backstop and basketball floor.
- Roof: built-up surface over Tectum decking.
- Sidewalls: curtain wall of colored concrete blocks.



World's Widest Span Timber Building... WITH DOME OF GLULAM MEMBERS BY TIMBER STRUCTURES, INC.

The spectacular fieldhouse of Montana State College, Bozeman, Montana, proves the ability of engineered timber to put a structural umbrella over tremendous areas—and the ability of Timber Structures, Inc. to produce such units with greatest precision, speed and cooperation.

The dome covers 1⅔ acres without interior posts. Glulam arch ribs are connected at the lower end to a circumferential tension ring, and at the upper end to a heavy compression ring. Nineteen lines of timber purlins are joined to the arch ribs, and heavy cross bracing adds rigidity to the structure.

For information on structural units of engineered timber see your nearest Timber Structures representative, or write for the new brochure, "Buildings for Tomorrow".

TIMBER STRUCTURES, INC.

P. O. Box 3782-C, Portland 8, Oregon

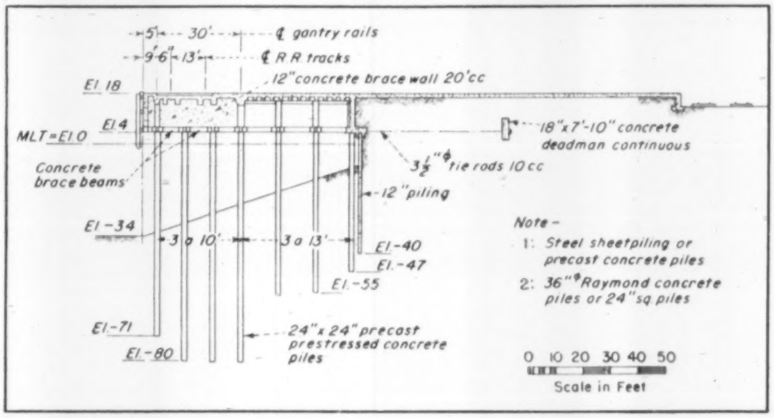
Offices in Ramsey, N. J.; Rochester, N. Y.; Boston; West Hartford; Cleveland; Charlotte; Chicago; Centerline, Mich.; Kansas City; Kirkwood, Mo.; Minneapolis; Wichita; Des Moines; Memphis; Dallas; Houston; Birmingham; Seattle; Spokane; Denver.

TIMBER STRUCTURES, INC. OF CALIFORNIA

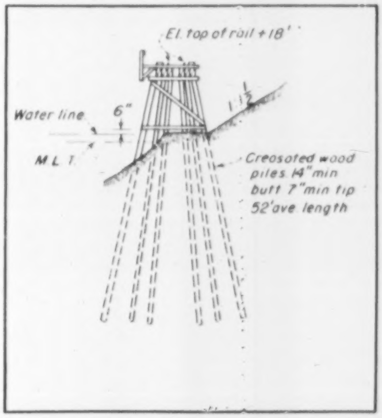
Richmond • Beverly Hills • Sacramento

Local Representatives throughout the United States and Canada

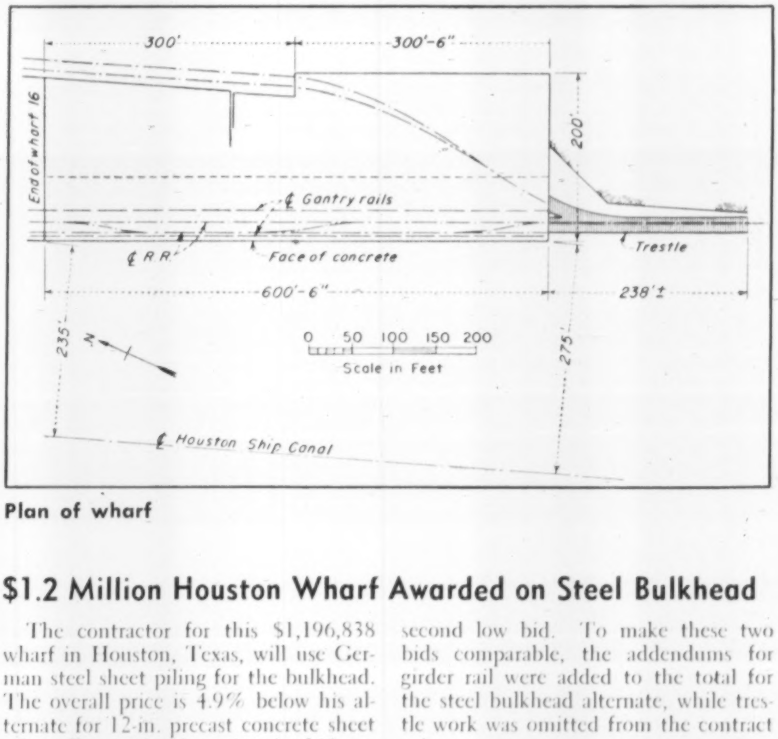
Unit Prices Bid by Contractors


5'
30'
℄ gantry rails
9'6"
13'
℄ R.R. tracks
12" concrete brace wall 20' cc
El. 18
El. 4
MLT = El. 0
Concrete brace beams
18" x 7'-10" concrete deadman continuous
3½"⌀ tie rods 10 cc
12" piling
El -34
3 a 10'
3 a 13'
El -40
El. -47
El. -55
El -71
El. -80
24" x 24" precast prestressed concrete piles
Note -
1: Steel sheetpiling or precast concrete piles
2: 36"⌀ Raymond concrete piles or 24" sq piles
0 10 20 30 40 50
Scale in Feet

Typical section through wharf . . .


El. top of rail +18'
Water line
6"
1½
1
M.L.T.
Creosoted wood piles 14" min butt 7" min tip 52' ave length

. . . and trestle


300'
300'-6"
End of wharf 16
200'
℄ Gantry rails
℄ R.R.
Face of concrete
Trestle
600'-6"
238' ±
235'
N
0 50 100 150 200
Scale in Feet
275'
℄ Houston Ship Canal

Plan of wharf

$1.2 Million Houston Wharf Awarded on Steel Bulkhead

The contractor for this $1,196,838 wharf in Houston, Texas, will use German steel sheet piling for the bulkhead. The overall price is 4.9% below his alternate for 12-in. precast concrete sheet piling. Except for the unit price bids on the trestle, all bids were lump sums. The table summarizes these and shows percentages of the total.

The loading and unloading wharf for Harris County Houston Ship Channel Navigation District is on the turning basin, at the head of navigation of the channel. Robert J. Cummins, Houston, is consulting engineer.

The contract to Spaw-Glass, Inc., Houston, is 7.94% below the engineer's estimate and 13.6% below the second low bid. To make these two bids comparable, the addendums for girder rail were added to the total for the steel bulkhead alternate, while trestle work was omitted from the contract price.

The wharf measures 200 x 600 ft. Its floor will be at elevation 18 ft above mean low tide. The channel depth in front is 34 ft. A 75-ft wide apron is designed with a live load of 500 lb per sq ft to support two railroad tracks and gantry rails.

The contract includes 27,700 sq ft of 45 x 600-ft steel sheet piling for a total of $74,000 or $2.67 per sq ft. It also calls for 20,200 lin ft of precast prestressed bearing piles, 24 x 24-in. to support precast concrete beams. Bidders had an option of 36-in. cast-in-place concrete piles.

Concrete for pile caps, columns, walls, deck, precast beams averages $61.60 per cu yd including the reinforcement.

Surfacing requires 6,700 sq yd of 6-in. concrete pavement and railroad track fills placed on a flexible base for a total price of $37,000 or $5.52 per sq yd. Stone riprap with 3,400 cu yd for $13,000 is priced about $3.82 and railroad work including the $20,000 addendum for 128#-lb girder rail in lieu of 90# Tee rail costs $64,000 for 6,100 lin ft or $10.49 per lin ft.

Railroad ties are priced separately on a unit price base together with timber piles and timber framing. Creosoted timber piles must have a minimum diameter of 14 in. at the butt and of 7 in. at the tip. Their average length is 52 ft.

Specifications require that class A concrete in beams and slabs test at 3,000 lb per sq in. In prestressed precast piles it must test at 5,000 lb per sq in.

Minimum wage rates in the Houston area are $3.00 to $3.25 for cement masons, $2.75 to $3.75 for electrical workers, $3.25 for heavy equipment operators, $2.75 for light equipment operators, $3.00 to $3.65 for iron workers, $3.125 to $3.50 for sheet metal workers and $1.75 for common labor. Fringe benefits add $0.075 per hour. For payment of less than these stipulated wages, the contractor must pay a $10 penalty per day per person.

Work under this contract must be completed in 280 working days. Liquidated damages are assessed at the rate of $100 per day.

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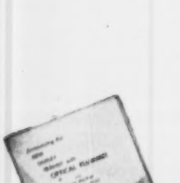


New Optical Plummet Built into Gurley Transit Saves Set-up Time, Improves Accuracy on Windy Days

Years ago, Gurley introduced lightweight instruments to combat wind vibrations Now Gurley further beats the wind problem with an optical plummet *built into* the instrument.

The new Gurley Optical Plummet Transit eliminates swing and sway of the cord and plumb—always time-consuming and exasperating on a windy location, and inaccurate as well. Positive accuracy of set-up is assured with the Gurley Optical Plummet.

The new Gurley transit is furnished with a tripod with built-in shifting head, and allows a two-inch shift of the instrument over the point. This provides greater latitude in initial set-up.

Gurley's new Optical Plummet Transit offers one of the advantages of the optical-reading theodolite *plus* the desirable features of simplicity and universal acceptance of the American transit. For further details, write for Bulletin OP-57.

GURLEY

W. & L. E. GURLEY Union Plaza, Troy, New York

Gurley—Since 1845

Houston Wharf

Continued from preceding page

dated damages are $100 per day.

The bidders include:

1C Spaw-Glass, Inc., Houston, Texas	$1,196,838
Alternate for steel bulkhead (contract)	1,173,666
for concrete bulkhead	1,234,057
Addendum for girder rail	20,000
Trestle Work	3,172
2 United Builders, Inc., Lafayette, Ind.	
Alternate for steel bulkhead	1,360,000
for concrete bulkhead	1,406,000
Addendum for girder rail	26,000
6 Brown & Root, Inc., Houston & Austin, Tex.	
Alternate for steel bulkhead	1,481,880
for concrete bulkhead	1,516,880
Addendum for girder rail	15,000
EE Robert J. Cummins, Houston, Tex	1,300,000

Bids: 8-30-56 Items	Lump Sum Price	% of Total
Bond premium, job set-up, haul roads	$18,000	1.50
Excavation, 140,000 cy total,		
dry from landside	46,000	3.84
wet from landside	98,000	8.19
wet from barge	16,000	1.34
Exist sheetpile, remove	10,000	0.84
Exist trestle, remove & salvage	15,000	1.25
Bearing piles, 24" sq, 20,200 lf		
prestressed, cast	190,000	15.88
drilled & driven	200,000	16.71
Pile bulkhead, steel sheet, 600 x 45', 27,700 sf @ $2.67 per sf	74,000	6.18
Concrete, class A		
in pile caps and lower framing	12,000	1.00
in columns to wharf deck	3,000	0.25
in walls & plaster to wharf deck	14,000	1.17
in wharf deck beams & slabs	19,000	1.59
steel pan concrete	16,000	1.34
in misc structures	7,000	0.58
Forms for		
pile caps and lower framing	11,000	0.92
columns to wharf deck	4,000	0.33
walls & plaster to wharf deck	11,000	0.92
wharf deck beams & slabs	16,000	1.34
steel pan concrete	17,000	1.42
misc structures	5,000	0.42
Beams, precast concrete	21,000	1.75
Reinforcing steel	115,000	9.61
Tie rods, 3½" & anchor walls, conc	32,000	2.67
Alterations to wharf No. 16	4,000	0.33
Backfill behind bulkhead	5,000	0.42
Storm drainage	6,000	0.50
Flexible base	6,000	0.50
Pavement, conc, 6" & RR track fills	31,000	2.59
Riprap, stone, 3,400 cy	13,000	1.09
Railroad work, 6,100 lf	64,000	5.35
Iron & steel, misc	8,000	0.67
Water lines & plumbing	11,000	0.92
Trestle piling & framing, new, 100 ft.	26,000	2.17
Fender system, 62,500 ftbm	27,666	2.31
Electrical work, flood lighting	22,000	1.84
Unit Price work for trestle		
Timber piles, 900 lf @ $1.30	1,170	0.10
Timber framing, 6,600 fbm @ $0.25	1,650	0.14
Railroad ties, 1,600 fbm @ $0.22	352	0.03
Contract Price Total	$1,196,838	100%

Bargain Contract For Concrete Wharf, Alabama

The $1,658,603 contract to construct a new wharf section with three berths at the Alabama state docks in Mobile went to Blount Brothers Construction Co. of Montgomery, Ala. This is 16% below the second low of four bids and 23% below the engineers' estimate. Trotter Ernest Engineering Co. is consultant for the Alabama State Docks Department in Mobile.

The new reinforced concrete wharf section is 1,500 ft long and 66 ft wide. It will be supported on prestressed concrete piles, 50 ft to 75 ft long and 16 in. to 20 in. square. No bids were received on the alternate for plain concrete pile. Creosoted timber will go into fender piles and other structures. Work includes also a sewer system with 36-in. concrete pipe, manholes, a railroad crossing and a bulkhead at the shore and end of the sewer.

The contract was low on most major items. For example, he bid $7.55 per lin ft on 18-in. prestressed concrete piles which drew bids from $8.00 to $9.25 per lin ft and $8.28 on 20-in. piles, compared to $9.00 to $10.15 per lin ft. He was low also at $0.45 on the placing of steel sheetpile with other bids running from $0.60 to $1.50 per sq ft. He priced creosoted timber piles at $2.50, against $3.00 to $3.30 per lin ft. On concrete in the wharf section the contract price is $49 compared to $56 to $75 per cu yd by other bidders. However, the contractor's price for reinforcing steel, $0.145, compares to a range from $0.13 to $0.15.

Specifications require that concrete test at 3,000 and 3,750 lb per sq in. in wharf sections and at 6,000 lb per sq in. in piles.

The State Docks Department will furnish 800 tons of steel sheetpiles and 6,600 lin ft of untreated timber to be installed by the contractor.

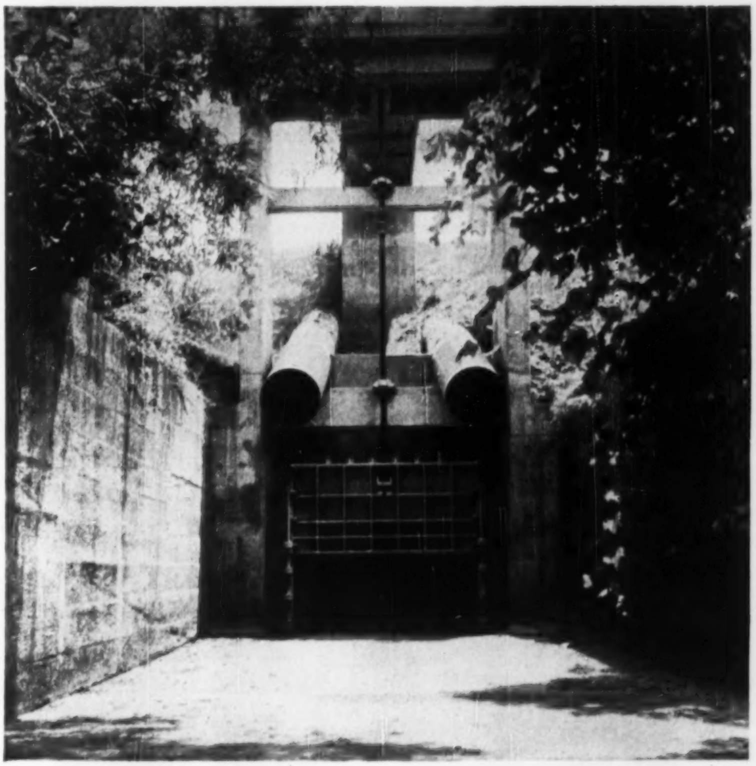
Scheduled hourly wage rates include $1.75 for common labor, $2.22 to $2.38 for semi-skilled labor, $2.95 for rodmen, $3.17 for pile drivers and $3.20 for crane operators and iron workers, and $2.73 to $3.20 for skilled labor.

1	Blount Bros. Construction Co., Montgomery, Alabama	$1,658,603
2	Standard Construction Co., Carrollton, Georgia	1,974,104
4	Massman Construction Co., Kansas City, Mo.	2,129,960
EE	Trotter Ernest Engineering Co., Birmingham, Alabama	2,151,000

Bids: 11-6-56 Items	Unit	Quantity	Unit Prices 1 C	2
Piles, steel sheet, section MZ27, pl	sf	57,820	$0.45	$0.60
Piles, conc, plain 18" square, in place *	lf	79,150	....	....
20" square, in place *	lf	28,225	....	....
* Alternate				
Piles, conc, prestressed 18" square in place	lf	69,953	7.55	8.00
20" square in place	lf	37,422	8.28	9.00
Piles, conc, plain or prestressed, 18" ip	lf	6,300	6.48	6.00
Test pile, conc, ip	ea	6	4,000	1,500
load test complete	ea	2	1,900	2,000
Conc, place in wharf section	cy	6,750	49.00	75.0
in sewer culvert	cy	400	52.00	65.00
Trap rock floor finish	sy	11,120	2.10	2.00
Steel, reinforcing	lb	1,350,000	0.145	0.14
Piles, untreat timb, ip	lf	6,600	1.15	2.00
Test piles, timb, ip	ea	2	1,350	300.00
Piles, fender, creosoted ip	lf	19,000	2.50	3.00
Timb, struct, creosoted ip pl	Mfbm	39	430.00	600.00
Excav & deposit, fill on bank slopes	cy	12,000	0.42	1.00
& bkfl, incl sheet piles, trench bracing, pumping, remove of paving & other obstruct, etc	ls	job	14,000	50,000
Crossing of GM & O tracks in construct of sewer, etc	ls	job	7,500	24,000
Curb angles	lb	23,000	0.40	0.30
Mooring bits	ea	24	400.00	400.00
Expansion joint dowels	ea	90	17.00	30.00
Manholes & gratings, on wharf detail A	ea	7	60.00	50.00
B	ea	6	72.00	60.00
C	ea	1	135.00	100.00
D	ea	6	120.00	100.00
Sewer manhole	ea	1	125.00	500.00
drainage gratings	ea	16	450.00	400.00
Bulkhead, brick, at shore end of sewer	ls	job	200.00	200.00
Guard pipes at exterior door posts	ea	40	50.00	70.00
Anchor bolts, shed column	ea	48	14.00	5.00
door post	ea	80	7.50	5.00
Metal, miscellaneous	lb	24,000	0.40	0.40
Engineer's office	s	job	1,900	5,000
Storm sewer, CP 36"	lf	395	25.00	50.00

Time to complete: 500 calendar days
Liquidated damages: $150.00 per day

HY-Q SLUICE GATES SEAL CULVERTS



Permit Maximum Flow
Require Minimum Structure
Give Tight Closure at Bottom of Culverts

Located between high ground and Red River, Louisiana, Lake Fort Buhlow drains excess water by gravity through two 4-foot x 5-foot box culverts. When Red River overflows its levee, Lake Fort Buhlow can no longer discharge its overflow by gravity. At such times a 96-inch x 48-inch Rodney Hunt Hy-Q® Flush Bottom Closure Sluice Gate closes tight, holding back the river so that pumps can discharge lake water through two 30-inch pipes.

The Rodney Hunt Hy-Q Flush Bottom Closure gate offers design flexibility and other exceptional advantages for water filtration, sewage treatment and many other sluice dam, channel and chamber flow control applications.

Catalog No. 75 gives complete information and specifications on Rodney Hunt Hy-Q sluice gates. Write for your free copy.

RODNEY HUNT MACHINE CO.
Water Control Equipment Division
85 Lake-St., Orange, Mass., U.S.A.

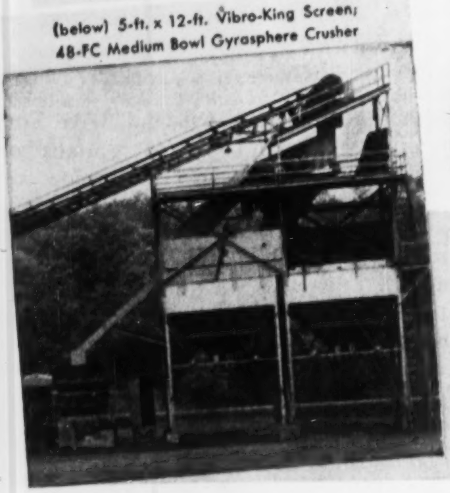
RODNEY HUNT

250-300 TONS HOURLY

of ⅞″ or 1½″—crushing hard and abrasive trap rock

(above) 5-ft. x 12-ft. Heavy-Duty Scalper; 489-S and 48-FC Coarse Bowl Gyraspheres

(below) 5-ft. x 12-ft. Vibro-King Screen; 48-FC Medium Bowl Gyrasphere Crusher



with TELSMITH EQUIPMENT

in the plant of NELLO L. TEER

● This quarry plant, at Savage, Maryland, is owned and operated by Nello L. Teer, of Durham, North Carolina, a long-time user of Telsmith in other plants. Crushing hard and abrasive trap rock, this plant's product is mostly used for black top. When producing minus 1½″ material, average capacity has been between 270 and 320 tons per hour; producing minus ⅞″, the average is 240 to 270 tons per hour.

Send For Bulletin 266

TELSMITH Equipment in this Plant:

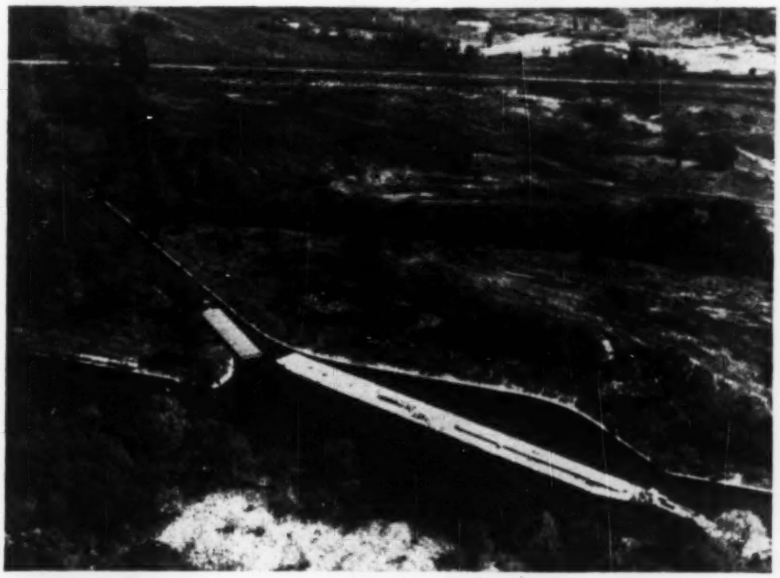
42″ x 14′ Heavy-Duty Apron Feeder (top right) • 36″ x 6′ Plate Feeder (under surge pile) • 489-S Gyrasphere Crusher • 5′ x 12′ 2-deck Heavy-Duty Scalper • 48-FC Coarse Bowl Gyrasphere Crusher • 5′ x 12′ 3-deck Vibro-King Screen • 48-FC Medium Bowl Gyrasphere Crusher • Five conveyors—three 30″, one 24″ and one 18″ wide.

Q-33

SMITH ENGINEERING WORKS

500 E. CAPITOL DRIVE **MILWAUKEE 1, WISCONSIN**

Representatives in Principal Cities in All Parts of the World • Cable Address: Sengworks, Milwaukee



SAG JUNCTION before widening work had started.

JUNCTION with widening work on Calumet-Sag Channel.

Second Leg on Widening Chicago's Calumet-Sag Channel

S. J. Groves & Sons Co., of Springfield, Ill., competed successfully against six other bidders for widening the second three-mile section of Calumet-Sag Channel in Chicago, Ill. The $2,400,200 contract is 3.5% below the second low bid and 13.5% below the engineer's estimate. Work is for the Chicago District, Corps of Engineers. Col. John Corey is district engineer.

Calumet-Sag Channel, 16.2 miles long and 9 ft deep, extends from its junction with the sanitary and ship canal to the Little Calumet River at Blue Island, connecting the Great Lakes with the Mississippi River. It is being widened to handle barge traffic which is expected to increase enormously with the opening of the St. Lawrence Seaway in 1959.

Widening the channel from its present usable width of 60 ft to 225 ft started in the fall of 1955 with the award to Mary Construction Co., Inc., Cape Girardeau, for the westerly three miles from Missouri Sag Junction to the section covered by the present contract. The photos show this first section as seen from Sag Junction (before and after work had started). The Engineers plan to let contracts on the remaining 10 miles in three sections. Separate contracts will cover the removal or replacement of bridges across the channel.

The Groves contract covers 2,415,000 cu yd of common excavation and 418,000 cu yd of rock excavation which includes 100% of the allowable overdepth quantity. The contractor has 28 months to complete the work.

Wage rates prevailing in the Chicago area include $2.08 for truck drivers, $3.00 for tractor drivers, $3.25 for cement masons, $3.37 for pipe fitters and $3.60 for power shovel operators.

The seven bidders include:

1C	S. J. Groves & Sons Co., Springfield, Illinois	$2,400,200
2	Western Contracting Co., Sioux City, Iowa	2,488,778
7	Mary Construction Co., Inc., Cape Girardeau, Missouri	3,280,880
EE	Chicago District, Corps of Engineers	2,774,597

Bids: 10-26-56 Items	Unit	Quantity	Unit Prices 1 C	 2
Excav, common	cy	2,175,000	$0 60	$0 72
over 2,175,000	cy	240,000	0 30	0 72
rock	cy	375,000	1 80	0 72
over 375,000	cy	43,000	1 30	0 72
Riprap dumped	cy	84,000	2 00	2 70
CMP, 42", 12-ga	lf	94	19 00	22 00
48" 12-ga	lf	98	23 00	25 00
5' 6", 8 ga	lf	230	62 00	50 00
Drain struct, Mill Creek	ls	job	13,000	40,000
Teason Creek	ls	job	38,000	50,000
Drain & outfall ditches	lf	17,200	2 50	1 00
Government field offices & shed	ls	job	12,000	99,000

Time to complete: 840 calendar days

Alternate Bids on Earthen Reservoir in Michigan

Stone riprap at $0.50 per sq yd took the contract away from concrete paved slopes at $4.00 per sq ft for this 100 million-gallon raw water reservoir. It will store Lake Huron Water as standby source for Midland, Michigan, and Dow Chemical Co. McNamee, Porter and Seely, Ann Arbor, Mich., are consulting engineers.

The $307,269 contract awarded to C. E. Utterback of Mt. Pleasant, Mich., was 4.9% below the second low bid and 14.95% below the engineers' estimate.

The reservoir will be 20 ft deep and 1,000 x 745 ft at the bottom. Work includes 348,000 cu yd of excavation in wet ground which accounts for 56.6% of the total price. Overhaul of 235,000 cu yd of surplus material to a site one mile from the reservoir takes 11.5% and the embankment takes 9.5%. Pipe lines, an access road and miscellaneous work on the site account for the remaining 22.4%.

Bid prices per cu yd ranged from $0.38 to $0.70 for excavation, from $0.11 to $0.54 for overhaul and from $0.07 to $0.65 for embankment. Slope

(Continued on following page)

Mister... COMPACTION *can* be done at a *profit*

LISTEN

Here's how to get the LOWEST POSSIBLE AVERAGE COST

- **THE JAY TAMPER** is the **ONLY** machine that eliminates costly tamping and poor compaction.
- **THE JAY TAMPER** combines **VIBRATION PLUS IMPACT** to keyseat the material to maximum uniform proctor densities.
- **THE JAY TAMPER** is a **LOW CAPITOL** investment **SELF CONTAINED UNIT.** Needs no expensive auxiliary equipment.
- **THE JAY TAMPER** is **LOW** in **MAINTAINENCE COST.** Field reports prove 80c per machine per month parts expense.
- **THE JAY TAMPER** is **LOW** in **OPERATING COST. ONE MAN** can operate the Jay **ALL DAY LONG** without excessive fatigue on but two gallons of gasoline.
- **THE JAY TAMPER** gives you **HIGH SPEED PRODUCTION** contractors claim machine pays for itself in 3 days over methods previously used.
- **THE JAY TAMPER** is **PORTABLE** and **VERSATILE. COMPLETE** unit weighs only 240 pounds, has interchangeable tamping shoes that can be changed in seconds to fit any job or soil condition.

Mail coupon below for name of nearest dealer.

THE JAY Company

JC

170 Hosack Street • Columbus 7, Ohio

Please send me additional information on the **JAY TAMPER**

My name

Street

City Zone State

Reservoir, Michigan

Continued from preceding page

protection drew bids from $0.50 to $10.00 per sq yd of the stone riprap alternate and from $4.00 to $12.00 per sq. yd. of the concrete option.

Concrete must test at 2,250 lb per sq in. after seven days and at 3,000 lb per sq in. after 28 days.

The nine bidders include:

1C	C. E. Utterback, Mt. Pleasant, Mich.	$307,269
2	W. H. Knapp, Monroe, Mich.	323,178
9	Sargent Constr Co., Saginaw, Mich	458,500
EE	McNamee, Porter & Seeley, Ann Arbor, Mich.	361,250

Bids: 10-3-56 Items	Unit	Quantity	Unit Prices 1 C	 2
General requirements	ls	job	$1,000	$2,500
Clearing and grubbing	ac	43	250.00	275.00
Stripping	ac	6	966.00	860.00
Unwatering	ls	job	4,000	10,000
Excavation	cy	348,000	0.50	0.38
Overhaul	cymi	235,000	0.15	0.15
Embankment	cy	98,000	0.30	0.30
Rolling for addnl- 2 trips or 1 coverage	sf	per 100	20.00	10.00
Gravel filter	cy	1,450	5.00	4.00
Slope protect (stone riprap)	sy	8,625	0.50	6.50
Alternate: conc slope protect	sy	8,625	5.00	6.50
Topsoil dressing	cy	3,000	0.60	0.70
Seeding	ac	5	150.00	100.00
Pipelines	ls	job	18,000	20,000
Conc work	cy	62	80.00	70.00
Acces Road	ls	job	10,000	8,000

To be completed: 6-1-57
Liquidated damages: $35.00 per day

*Plan to use concrete slabs 2-ft square and 6-in. thick

Emergency Slide Repairs On Gateway Canal, Utah

The contractor for this $71,193 job has only 75 days to stabilize slides at three locations of Gateway Canal in Ogden, Utah, which occurred subsequent to original construction work on the canal. Work must be completed before the winter approaches, in order that moderate winter operations of the canal can be observed before capacity operation is required next spring. This is a Weber Basin Project of the Bureau of Reclamation in Ogden. Clinton D. Woods is project manager.

This short deadline raised unit prices and pushed the contract to Fife Construction Company of Ogden up to 23% above the engineer's estimate. But the price is 10% below the second low and 27% below the high fifth bid.

The contract calls for excavation, drain installation, backfill, repairs to two concrete pipe culverts and the removal and replacement of concrete canal lining.

Specifications require that Class A concrete contain approximately six sacks of cement per cu yd.

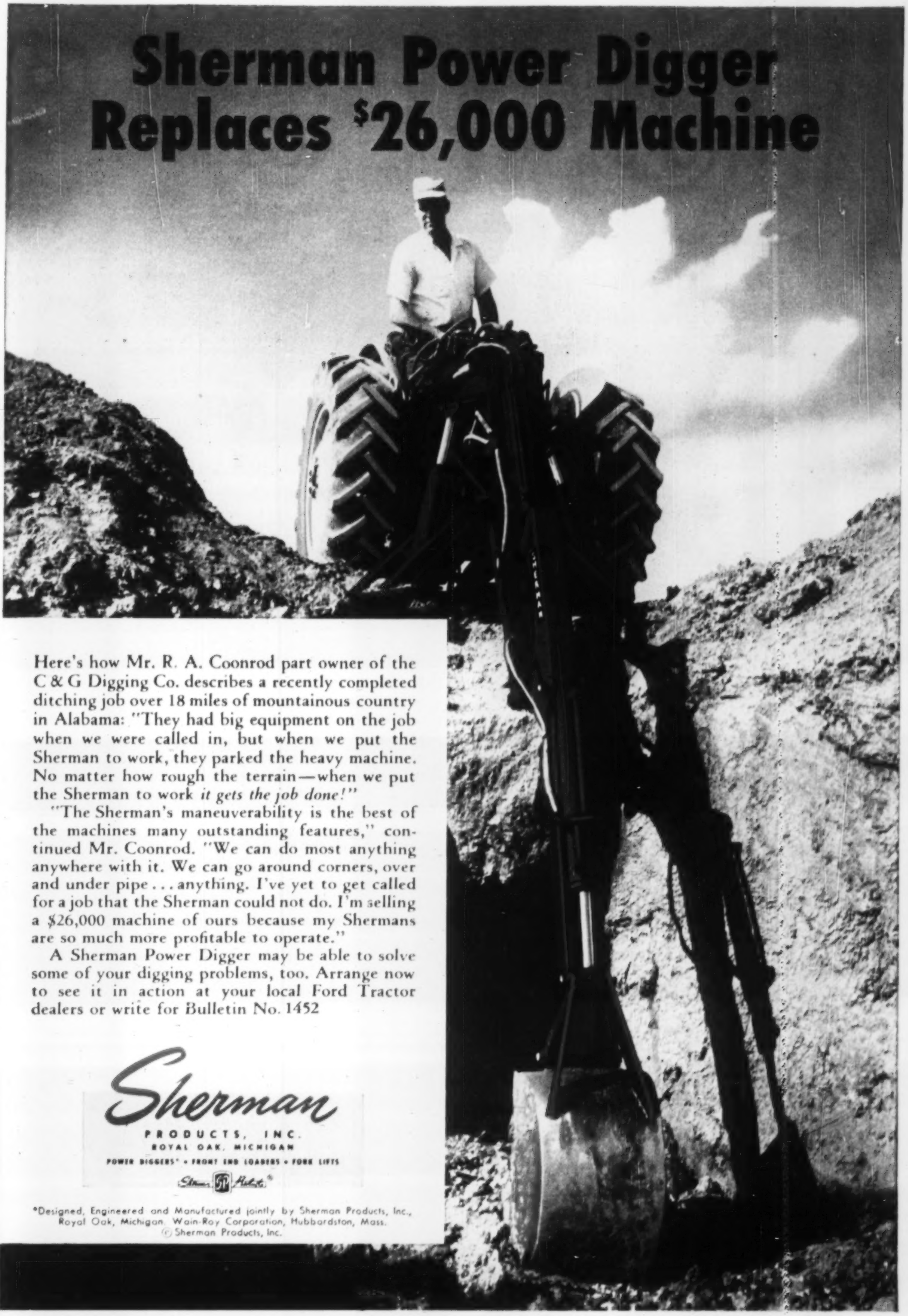
Hourly wage rates scheduled for this contract range from $1.975 for common labor to $2.80 for skilled labor.

The five bidders include:

1C	Fife Constr Co., Brigham City, Utah	$71,093
2	Morrison-Knudsen Co. Inc., Salt Lake City, Utah	79,164
5	Legrand Johnson Construc Co., Inc., Logan, Utah	96,911
EE	Bureau of Reclamation, Ogden, Utah	57,895

Continued on following page

Sherman Power Digger Replaces $26,000 Machine



Here's how Mr. R. A. Coonrod part owner of the C & G Digging Co. describes a recently completed ditching job over 18 miles of mountainous country in Alabama: "They had big equipment on the job when we were called in, but when we put the Sherman to work, they parked the heavy machine. No matter how rough the terrain—when we put the Sherman to work *it gets the job done!*"

"The Sherman's maneuverability is the best of the machines many outstanding features," continued Mr. Coonrod. "We can do most anything anywhere with it. We can go around corners, over and under pipe . . . anything. I've yet to get called for a job that the Sherman could not do. I'm selling a $26,000 machine of ours because my Shermans are so much more profitable to operate."

A Sherman Power Digger may be able to solve some of your digging problems, too. Arrange now to see it in action at your local Ford Tractor dealers or write for Bulletin No. 1452

Sherman
PRODUCTS, INC.
ROYAL OAK, MICHIGAN
POWER DIGGERS* • FRONT END LOADERS • FORK LIFTS

*Designed, Engineered and Manufactured jointly by Sherman Products, Inc., Royal Oak, Michigan. Wain-Roy Corporation, Hubbardston, Mass.
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The man behind the gun will tell you . . .

WHITE GIVES YOU
greater, longer-lasting precision–

Shown, model 7014 with "A" standard. Sold complete with tripod case and field equipment. Model 7014, same unit with "U" standard, also available.

. . . yet costs less than other quality engineers' transits

LIKE every White quality-built instrument, these engineers' transits give you greater dollar-for-dollar value than any other comparable unit.

For example: White uses a recently-developed Swiss Dividing Engine to cut graduations into solid silver. This insures super-precision from the beginning, safeguards it through more years of hard field usage.

In addition, White engineers' transits give you internal focusing, covered leveling screws, and coated optics. These and a host of other design and operating features combine to give you a transit unsurpassed for ease, speed, accuracy, economy and long-lived dependability. Write for Bulletin 1256 and the name of your nearest dealer. DAVID WHITE COMPANY, 317 W. Court Street, Milwaukee 12, Wisconsin.

White Coated Optics give you an image like this...

not this

Even at long distances under adverse weather conditions, you get a clear, sharp image — without halation.

DAVID WHITE COMPANY

We offer expert REPAIR SERVICE on all makes, all types of instruments.

Slide Repairs, Utah

Continued from preceding page

Bids: 10-2-56 Items:	Unit	Quantity	Unit Prices 1C	2
Excav, sta 342+00	cy	2,200	$1.00	$2.85
sta 358+00	cy	22,300	0.90	0.60
sta 397+50	cy	300	2.00	4.50
from borrow	cy	2,000	0.90	2.30
Remove exist canal lining	sy	430	2.00	3.30
Prep foundations for conc lining	sy	923	2.00	5.00
Backfill	cy	6,900	0.80	0.65
compact	cy	150	3.00	9.00
Embankment, construct	cy	14,200	0.65	0.60
compact	cy	9,500	0.45	0.42
Gravel fill, select, F&P	cy	2,400	3.00	4.00
Conc in lining & struct	cy	110	100.00	93.00
Cement f & handle	bbl	165	6.00	7.00
Reinf bars f&p	lb	250	0.25	0.30
RCP, culv 30", f&l	lf	25	16.00	13.00
Drain pipe, open jt, 6", f&l	lf	1,230	2.50	5.50
conc w/cmt jts, 6" f&l	lf	55	2.00	2.00
stl 6" f&l	lf	235	6.00	4.00

Tie to complete: 75 calendar days
Liquidated damages: $25.00 per day

Earthfill Dam in Missouri
25% Below Estimate

This "earthfill type" dam will have 394,000 cu yd of rock fill and will include, in addition to embankment and channel excavation, a bituminous concrete access road. This is the Pomme de Terre Dam and Reservoir for the Kansas City District of the Corps of Engineers, F. M. Fahy, Hermitage, Missouri, resident engineers. Contract for $779,549 went to Cosmo Construction Co. of Oklahoma City on a low bid 12.6% below the second and 51% below the high of 13 bids. It is 25% below the engineer's estimate.

The site is three miles southwest of Hermitage and 14 miles from the nearest railhead at Weaubleau, Mo.

The dam is 7,420 ft long, 155 ft above the streambed. It is designed to control floods and supplement low water flows in that area. It has an overall length of 7,420 ft and a height of 155 ft from the streambed.

Work under this contract includes 900,000 cu yd of excavation including 400,000 cu yd in rock, 920,000 cu yd of fill and 37,000 cu yd of filter material.

Contract prices for excavation ranged from $0.173 per cu yd in foundation to $1.60 per cu yd of cutoff trench. Rock excavation in channel is priced $0.78 per cu yd.

Wage rates governed by Associated General Contractors agreement are $2.30 to $3.15 for skilled labor, $1.80 to $2.16 for semi-skilled and $1.16 for unskilled labor.

The thirteen bidders include:

1C	Cosmo Constr. Co., Oklahoma City, Okla	$779,549
2	George Bennett Constr. Co., Bethel, Kansas	891,926
13	R. G. Aldridge, Contractor, Kansas City, Kansas	1,593,734
EE	F. M. Fahy, Resident Engineer, Hermitage Mo	1,032,771

Bids: 11-8-56 Items	Unit	Quantity	Unit Prices 1 C	2
Clearing	ac	33	$60.00	$150.00
general	ac	17	115.00	150.00
selective & pruning	ac	7	230.00	300.00

Continued on page 227

LIPPMANN *Rock Ram* *Jaw Crushers*

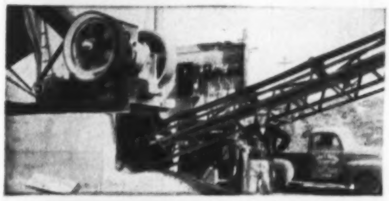
30x36 Rock-Ram crushing plant in Ohio includes Lippmann feeder, conveyors, screens, pulverizer and bins.

IT'S THE BEST CRUSHER INVESTMENT I'VE EVER MADE...

"We have operated our Lippmann Crushing Plant for almost a year now and your 24x36 Rock-Ram jaw crusher mounted on it is a real rock breaker. It requires practically no attention, uses little power and will take all we can give it and more. It's the best crusher investment I've ever made."

(signed)
Wilmer Gerdes,
owner
Gerdes Quarry,
Dixon, Ill.

10x36 Rock-Ram crusher in a stationary crushing plant in Illinois. Also includes Lippmann feeder, conveyors and screens.



20x36 Rock-Ram mounted on primary plant with feeder and conveyor, in an Illinois pit.

Mr. Gerdes' praise of his Lippmann Rock-Ram is typical of the pride voiced by Rock-Ram owners everywhere. And with good reason — for each has a machine that, pound for pound, is the strongest crusher built. And better than this are other Rock-Ram advantages . . . heavier flywheels and greater crushing-stroke eccentricity to give more impact and bigger bite for greater production and lowest power usage . . . larger shaft and oversize roller bearings that assure longer uninterrupted service with less chance of the shaft and bearing failures that makes ownership of ordinary crushers so expensive. The feed opening is specially engineered larger with size measured at the closed stroke of the eccentric instead of the open. This gives Rock-Ram owners the added bonus of a greater-than-specified opening size.

The Rock-Ram owner also knows that his crusher has many of the same superior crushing advantages of the famous Lippmann Grizzly-Kings — but at Rock-Ram's lower cost. Small wonder that Mr. Gerdes says, "It's the best crusher investment I've ever made."

Rock-Rams are made in sizes 10" x 16" to 30" x 36". Bulletin 1111 contains full information on these superb crushers. Contact your Lippmann Distributor, or write to Lippmann Engineering Work Inc., 4625 W. Mitchell St., Milwaukee 14, Wis.

1111-56-4

LEW

LIPPMANN

SINCE 1923

CRUSHERS FEEDERS SCREENS CONVEYORS CRUSHING & WASHING PLANTS

Gets back on new slab sooner — speeds paving schedules

KOEHRING 16-E ***twinbatch®***

paver on rubber tires is as mobile as your batch trucks. It works on or off-pavement — can get back on new slab in as little as 7 days to pave adjoining highway strips, scattered intersections, approaches to driveways and side roads. This time-saving "run-about" makes self-powered moves at 9 m.p.h. Yet, for all its mobility, the Koehring 16-E *twinbatch* is primarily a production paver — exceeds the output of large single-drum pavers on main highway work. For instance —

On straight-production paving, the Koehring 16-E hits a top output of 86.7 batches an hour (based on 60-second mixing cycle). This reserve production capacity with *twinbatch* Autocycle mixing offsets normal job delays — lets you pick up lost time which cannot be made up with a limited production single-drum paver.

Averages 50 cu. yds. an hour

As a result, the Koehring 16-E *twinbatch* easily maintains an average of over 76 batches an hour — 8 hours a day. Based on 16 cu. ft. per batch, plus the usual 10% overload, this assures you 50 cu. yds. of concrete per hour — with a small crew — on your main-highway paving jobs.

While its usefulness is unlimited as a general-purpose paver, this versatile Koehring 16-E also serves as a mobile concrete mix plant. On construction of curbs, gutters, culverts, bridges, pilings, it discharges into overhead hoppers, forms, chutes, or loads trucks. Elevating boom reaches up and out 60° — gives controlled discharge at 21-foot height (higher with special boom).

See for yourself how the big production capacity, overall versatility, and rubber-tired mobility of this Koehring 16-E *twinbatch* can put you miles ahead on your paving schedules. Get all the facts from your Koehring distributor, or write us for 16-E catalog. Big 34-E *twinbatch* is also available for major highway, airport paving.

KOEHRING Company

Milwaukee 16, Wisconsin

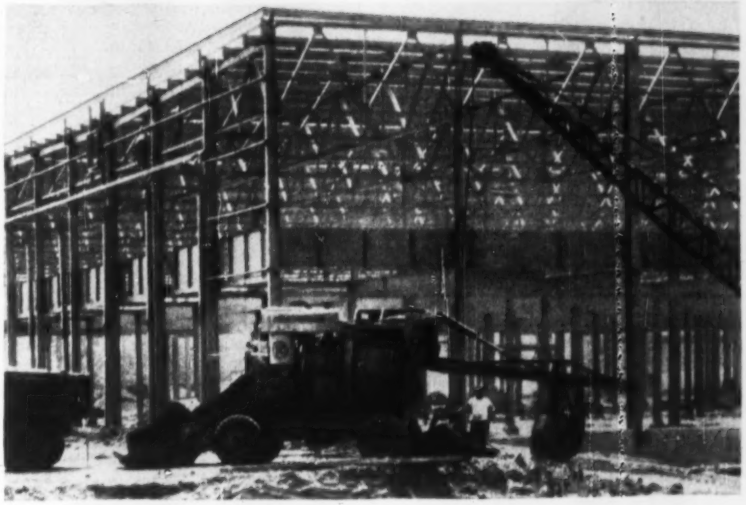
(Koehring Subsidiaries: JOHNSON • PARSONS • KWIK-MIX) K557

Big rubber-tires are easy on the sub-grade

Notice how there's little or no scuffing on the sub-grade with a Koehring rubber-tired 16-E paver. When working between forms, flotation of the big 11:00 x 20 pneumatic tires protects the grade against surface damage — saves unnecessary filling and re-leveling. This rubber-tired advantage also lets the Koehring 16-E *twinbatch* work on pavement without planking to pour adjoining slabs, widen highway and airport strips, pave intersections, pour concrete for curbs, gutters, culverts.

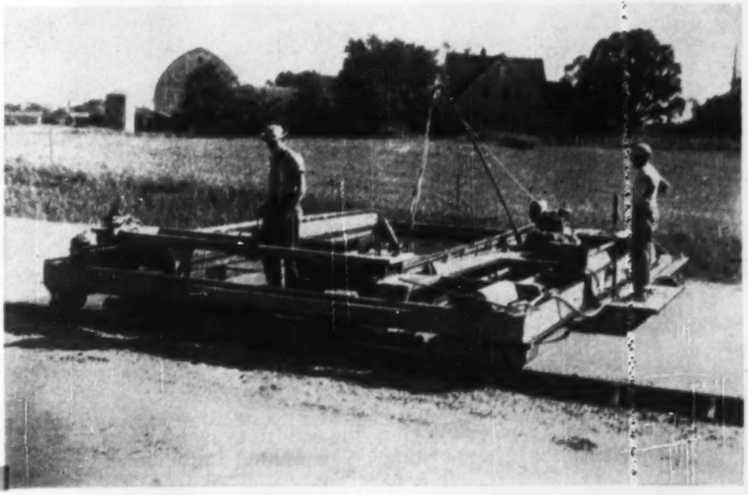
Mobile 16-E paver serves as a concrete mix plant

On building construction, versatile Koehring 16-E *twinbatch* pours footings, floors, columns — is never "grounded". Power-controlled boom swings in a 160° arc, or elevates 60° for overhead discharge — locks and holds in any position. Controlled-discharge bucket dumps anywhere along the 25-foot boom, can be opened or closed at any time for gradual discharge. Water-level capacity of bucket is 24 cu. ft. That's more than ample capacity to hold the full 16 cu. ft. batch of concrete, plus 10% overload.



Precision finisher keeps up with any paver

"Timely", precision-finishing is important on any paving job. Operating at almost twice the speed of a 34-E paver, Koehring Longitudinal Finisher handles all practical consistencies of concrete — harsh, wet or dry. It overcomes slump difficulties on grades and elevated curves. Produces mechanically accurate concrete slab surface, 8 to 30 feet wide, with uniform crown transitions.



KOEHRING HEAVY DUTY

like no other building device Spanall®

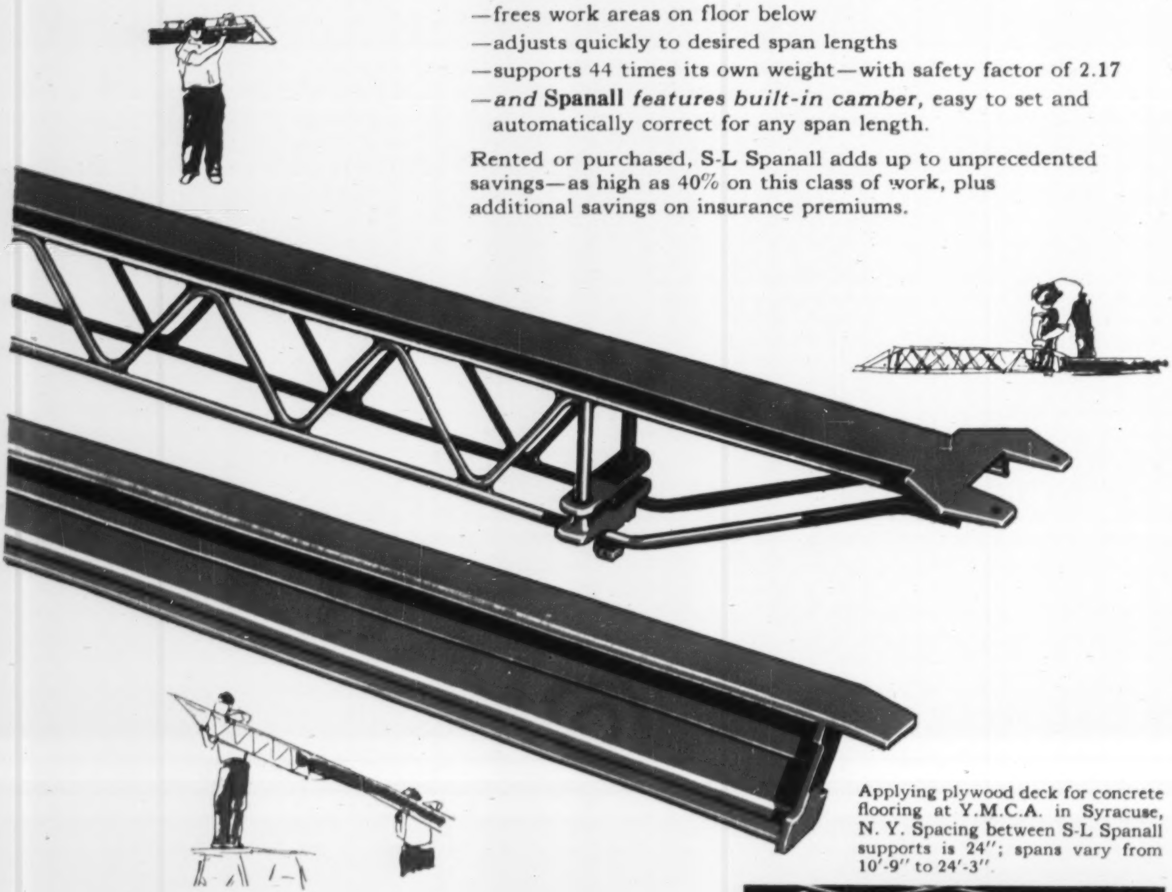
HORIZONTAL SHORING

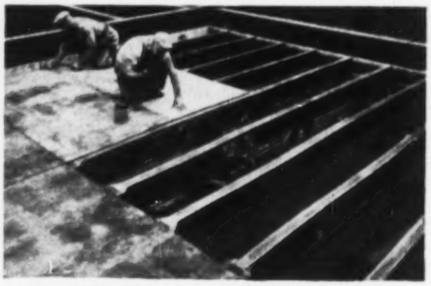
helps contractors save time, labor and money

S-L Spanall assembles fast and conveniently to desired span lengths—without need for intermediate supports

—frees work areas on floor below
—adjusts quickly to desired span lengths
—supports 44 times its own weight—with safety factor of 2.17
—*and* **Spanall** *features built-in camber,* easy to set and automatically correct for any span length.

Rented or purchased, S-L Spanall adds up to unprecedented savings—as high as 40% on this class of work, plus additional savings on insurance premiums.





Applying plywood deck for concrete flooring at Y.M.C.A. in Syracuse, N. Y. Spacing between S-L Spanall supports is 24″; spans vary from 10′-9″ to 24′-3″.

SPANALL OF THE AMERICAS, INC.
787 United Nations Plaza, N. Y. C. Telephone MUrray Hill 5-7100
UNIVERSAL BUILDERS SUPPLY CO., INC.
787 United Nations Plaza, N.Y.C. 408 No. Midler Ave., Syracuse, N.Y.
SPANALL OF CANADA, LTD.
P. O. Box 171, Postal Station E Toronto, Ontario

Complete information and engineering service available through local distributors in United States, Canada and Latin America.

Dam, Missouri

Continued from page 222

Bids: 11-8-56			Unit Prices	
Items:	Unit	Quantity	1C	2
Grubbing	ac	28	70.00	200.00
Excav, foundation	cy	408,000	0.173	0.20
cutoff trench	cy	8,400	1.60	3.00
Foundation cleanup	sy	36,000	0.10	0.30
Excav, borrow	cy	56,000	0.20	0.20
overburden, channel	cy	56,000	0.78	0.40
rock channel	cy	394,000	0.78	0.90
Fill, compacted, impervious	cy	175,000	0.13	0.10
random	cy	153,000	0.13	0.10
protection levee	cy	50,500	0.04	0.10
berm	cy	46,000	0.04	0.10
previous	cy	144,000	0.06	0.10
Filter, fine	cy	7,000	1.60	2.50
intermediate	cy	6,600	1.60	2.00
spall	cy	24,000	1.30	2.00
Fill, rock	cy	352,000	0.04	0.10
Additional rolling for compaction	hr	300	15.00	7.00
Drill & grout equip, mobil & demobil	ls	job	2,600	600
Cutoff trench fndn prepare	sy	7,500	0.60	1.50
Drill grout holes, first 4,000 lf	lf	4,000	5.00	6.50
lf in excess of 4,000	lf	5,500	5.00	6.25
Drill exploratory NX Holes, first 500 lf	lf	500	7.80	7.00
lf in excess of 500 lf	lf	1,000	7.60	6.75
Portland cement in grout first 2,500 cf	cf	2,500	2.25	1.75
in excess of 2,500	cf	5,000	2.25	1.75
Sand in grout first 5,000 cf	cf	5,000	0.25	0.75
in excess of 5,000	cf	9,000	0.25	0.75
Curtain grout, pl first 1,000 cf	cf	1,000	5.30	5.00
cf in excess of 1,000	cf	3,000	5.30	5.00
Connections to group holes	ea	800	5.00	5.00
Piezometer & settlement gages	ls	job	2,300	2,000
Clear & grub, roads	ls	job	4,000	2,500
Excav, common	cy	18,700	0.40	0.50
rock	cy	18,300	1.50	0.50
Linear grading, 100 sta	ea	26	20.00	25.00
Pipe culvert 15"	lf	212	4.00	3.50
18"	lf	226	5.00	4.00
24"	lf	284	7.30	6.00
30"	lf	60	8.70	8.00
Agg for base crse	t	9,400	1.50	2.40
Bit pime coat	gal	6,500	0.23	0.20
Aggregate mixed	t	975	5.75	3.25
cover	t	117	7.00	5.00
Cutback asph, MC-3	gal	19,900	0.23	0.18
RC-3	gal	2,400	0.23	0.20
Surfacing matl	cy	200	4.60	4.00
Guide posts	ea	40	5.50	6.00
Guard rail	lf	1,050	3.50	2.75
Ditch diversion dams	ls	job	130.00	175.00
Safety fence	lf	2,250	0.57	0.75
Crushed rock surface	cy	700	4.60	2.40
Calcium chloride	lb	13,500	0.07	0.10

To be completed: 12-1-57

Denver's Water Diversion Under Continental Divide

Construction of the 15¾-mile Vasquez Tunnel, lining almost 1¾ miles of the existing Jones Pass Tunnel and the transition structure, stilling pool, cut and cover conduit connecting the two, drew five bids ranging from 3.4 million to $6.87 million.

The Denver Board of Water Commissioners awarded the job on the low bid to Michigan Sewer Construction Co. of Detroit, 11.8% under the engineer's estimate, 13.3% under the second low and 49.8% under the high bid. Tipton and Kalmbach, Inc. of Denver is the engineer.

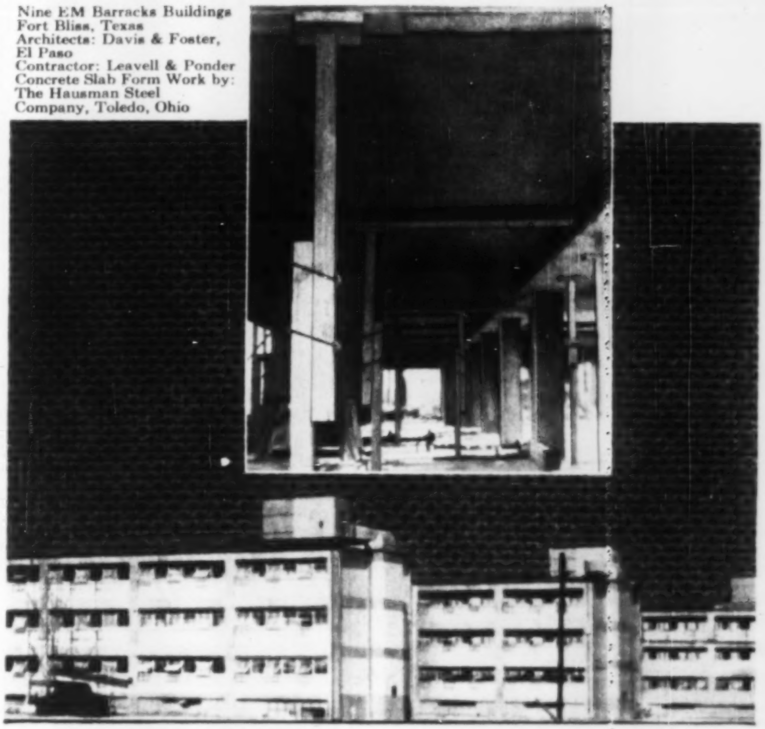
Both tunnels will have a finished diameter of 7 ft and horseshoe cross section.

The Vasquez Tunnel is 78,000 ft and the Jones Pass lining is 9,090 lin ft. Tunnel supports are timber, steel and roof-bolting.

Prices are shown also for removing steel and timber supports.

The contractor's low bid on excavation pushed his total far down below

Continued on following page



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Architects: Davis & Foster, El Paso
Contractor: Leavell & Ponder
Concrete Slab Form Work by: The Hausman Steel Company, Toledo, Ohio

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Denver Tunnels

Continued from preceding page

the competitive bids. He priced at $3.00 per cu yd excavation in open cut which drew bids ranging from $5.00 to $12.00 from the competition and at $40.00 per cu yd tunnel excavation as compared to $46.60 to $70.00. Contract prices for tunnel lining are $38 per cu yd in Vasquez Tunnel, while the other bids ranged from $35 to $112 and $39 per cu yd in Jones Pass tunnel compared to $35 to $155.

Concrete is specified for a maximum water cement ratio of 0.55 to 1 by weight.

Wage rates for Denver include $2.00 for common labor, $2.15 for truck drivers, $2.76 to $2.93 for hoisters and power shovel operators, $2.975 for cement finishers and $3.00 for iron workers.

The five bidders include:

1C	Michigan Sewer Constr Co., Detroit, 19, Mich	$3,449,215
2	Gibbons & Reed Co. & Floyd Shofner, Salt Lake City, Utah & Puente, Calif	3,978,830
5	G. L. Tarlton Contracting Co., 5500 West Park Avenue, St. Louis 10, Mo.	6,865,780
EE	Tipton & Kalmbach, Inc., 831 Fourteenth Street, Denver, Colo.	3,911,560

Bids: 10-26-56 Items	Unit	Quantity	Unit Prices 1 C	 2
Clearing	ac	5	500.00	2,000
Excav, uncl, in open cut	cy	30,000	3.00	12.00
in Vasquez Tunnel	cy	44,000	40.00	46.60
for enlargement of Vasquez tunnel	cy	150	75.00	70.00
Bkfl & structs	cy	700	2.00	1.50
Compact bkfl around structures	cy	700	3.50	1.50
Riprap, damped	cy	100	6.00	15.00
Constr sewer pipe drain	lf	1 30	2.00	3.50
Tunnell supports, steel	lb	645,500	0.22	0.35
timber	mbf	123	500.00	300.00
roof-bolting	lb	1,600	0.40	1.00
steel, remove	lb	25,000	0.20	0.20
timb, remove	mbf	5	200.00	300.00
Drill feeler or grout holes through rock	lf	1,500	2.50	5.00
grout holes through conc lining	lf	750	4.00	1.50
Pipe for pressure grouting	lb	2,300	1.25	1.30
Connections for grouting	ea	300	5.00	15.00
Pressure grouting	cy	300	60.00	150.00
Remove conc from exist outlet struct	cy	65	60.00	25.00
Portland cmt f&h	bbl	40,000	7.00	6.00
Reinforcement, f&p	lb	91,000	0.21	0.20
Conc lining in Vasquez tunnel	cy	17,250	38.00	35.00
in Jones Pass Tunnel	cy	7,800	39.00	35.00
Conc in structs, plain	cy	50	75.00	25.00
reinf	cy	500	90.00	80.00
Gunite coating & lining	cy	30	100.00	150.00
Radial gates & hoists, f&i	ls	job	8,000	7,500
Miscellaneous metal, f&i	lb	1,400	1.50	1.00
Metering equip f&i	ls	job	3,000	2,000
CMP, 18", f&i	lf	60	8.00	10.00
Chain-link fencing, f&e	lf	430	8.00	7.00
Telephone cable, f&i	ls	job	10,000	15,000

Work started: 11-8-56 To be completed: May 58

This is part of Denver's $101-million water project that includes the Harold Roberts Transcontinental Divide Tunnel, 23 miles, let for $38,857,250 in July to Blue River Constructors, a joint venture of Mid-Valley Constructors, Houston, Tex., S. A. Healy, Chicago, J. A. Jones, Charlotte, N. C., Tompkins Co., Washington, D. C., A. S. Horner Construction Co., Denver, and Colorado Constructors, Denver. This brings water from the Blue River into the Denver system.

For a description of this complete water development program see ENR May 24 page 25.

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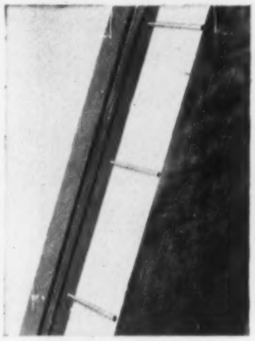
FOR EXPANSION AND CONSTRUCTION JOINTS



St. Lawrence Power Project, Power House

Warsak Hydro-Electric Project of Pakistan

McCormick Dam, Project No. 2

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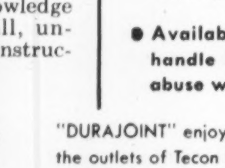

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Prices Up on New York City's Water Tunnel

The third section of New York City's West Delaware tunnel at $11.8 million averages $453 per lin ft, 28% and 22% more than last year's average $353 and $372 per lin ft of the second and first sections. But these jobs are not strictly comparable.

All three sections are circular tunnel with roof-bolt supports and 6-in. and 8-in. concrete lining to a finished diameter of 11 ft 4 in. The new 26,400 ft section includes a 14-ft shaft to 380-ft depth. This is in contrast to last year's 60,000-ft second section with two shafts of 310-ft and 460-ft depths and 43,000-ft first section with its 520-ft shaft and an intake channel. (ENR Nov. 3, 1955, pp. 92, 93 and Dec. 22, 1955, p. 48)

Just over half of the new section is in Delaware County with the rest in Sullivan Conty. Stanley M. Dore is chief engineer of New York's Board of Water Supply.

MacLean Grove & Co., Inc., New York, teamed up with George M. Brewster & Son, Inc., Bogota, New Jersey, to turn in the low bid $11,771,580, 1.4% below the second and 16.7% under the high of seven bids.

The contractors on the first two sections are Johnson, Drake & Piper, Grafe-Callahan, Tecon, Winston Brothers and The Conduit & Foundation Corp.

The new contract unit prices are compared with their counterparts of last year in the accompanying table. While the sections are not strictly comparable, this year's prices appear to run around 25% higher than last year's. In the same period wages and prices have gone up 6.7% in New York City and 4.6% in a country-wide average. This is the reverse of the situation as a year ago, when the contractor's unit price rise from the East Branch bids in 1949 was less than the rise in wages and materials.

Portland cement has gone up from $4.75 to $5.75 per bbl, reinforcing steel from $0.18 to $0.20 per lb and roof bolt supports from $0.20 to $0.40 per lb.

Five items, however, have gone down in price. These include: protective coating of cement mortar and surface dressing and grassing down 12%, crushed stone and gravel, down 34%, miscellaneous metal work, down 50% and liquid chlorine and aluminum sulphate, down 70%. Prices have not changed for timber and lumber in open cut and for vitrified, asbestos cement and corrugated metal pipe.

Specifications require a 1:4:6 mix for class A concrete.

The Board of Water Supply will furnish chlorinators, platform scales, chemical feeder and flash mixer for chlorination and treatment of pumpage.

Wage rates to be paid under this contract include $2.25 for common labor, $2.375 to $2.55 for truck drivers, $2.80 for miners and drill runners in shaft and tunnel, $3.50 for minor equipment operators and $3.90 for major equipment operators.

The new contract contains a provision permitting the engineer to allow in the partial payments to the contractor 75% of expenditures for construction plant.

Bidders include:

Third Section Bids: 9-25-56
26,400-lin ft tunnel with one shaft

1C	MacLean-Grove & Co. Inc, New York, and George M. Brewster & Son, Inc., Bogota, N. J	$11,771,580
2	Curley Constr. Co., Inc., Rochelle Park, N. J.; Shoreland Constr. Co., Red Bank; The Napp-Grecco Co., Newark, N. J.	11,942,575
7	Walsh Constr Co., New York; B. Perini & Sons, Inc., Framingham, Mass.; Morrison-Knudsen Co., Inc., Boise, Ida.; Peter Kiewit Sons' Co. Omaha, Neb.; Henry J. Kaiser Co., Oakland, Calif	14,134,980

Second Section Bids: 10-25-55
60,000-lin ft tunnel with two shafts

1C	Johnson, Drake & Piper, Inc., New York; Grafe-Callahan Const. Co., Los Angeles; Tecon Corp., Dallas, Tex.; Winston Bros. Co., Minneapolis, Minn.; The Conduit & Foundation Corp., Philadelphia, Pa	$21,200,100
2	Walsh, Perini, Morrison-Knudsen, Kiewit, Kaiser Cos.	25,252,326
4	Merritt-Chapman & Scott Corp., New York, Frazier-Davis Constr. Co., St. Louis, Missouri	26,557,900

		Contract 453			Contract 452		
		Quantity	Unit Prices		Quantity	Unit Prices	
Items	Unit		1 C	2		1 C	2
Borings	lf	1,000	$12.00	$5.00	1,000	$10.00	$12.00
Sink shaft in earth & line with conc mary	lf	26	3,000	4,000	68	2,000	1,106
in rock, to A 6"	lf	102	3,500	4,000	173	1,500	931.00
" " 8"	lf	252	3,600	4,000	488	1,550	931.00
Exc tun & line with conc mry, to A 6"	lf	24,910	290.00	295.00	57,650	255.00	336.00
8"	lf	1,000	310.00	305.00	2,000	280.00	346.00
Exc & conc mary, enlarge shaft & tun	cy	80	81.00	100.00	150	60.00	95.00
Cmt mortar, prot coat	cy	2,500	40.00	55.00	5,000	45.00	59.00
Roof bolt, tun supt	lb	850,000	0.40	25	1,750,000	0.20	0.22
Str stl support, sha & tun	lb	40,000	1.00	60	40,000	0.75	0.24
Drill holes for roof bolt	lf	150,000	2.00	2.00	325,000	1.50	0.43
Shaft & tun, timbering	Mbf	150	250.00	150.00	300	150.00	387.00
pumping	Mfg	50,000	0.50	1.00	200,000	0.20	0.10
Drill holes, grout & misc	lf	45,000	2.00	2.00	100,000	1.00	1.28
Pipes, stl, for grouting	lf	5,000	2.00	3.00	10,000	1.75	2.86
Make conns for grout	ea	2,000	10.00	12.00	4,500	4.00	19.47
Sand for filters, grout & prot coat of cmt mortar	cy	3,500	10.00	13.00	8,000	7.00	5.80
Grout, mix and place	cy	8,000	50.00	26.00	16,000	20.00	11.80
Excav in open cut, earth	cy	13,000	1.50	10.00	18,000	1.40	3.35
rock	cy	200	5.00	80.00	200	3.50	10.12
Refill and embank	cy	10,000	2.00	1.00	9,000	1.25	2.71
Surf dress & grass	cy	4,000	4.00	4.00	8,000	4.50	2.72
Timb & lumb, open cut	Mbf	100	350.00	300.00	60	350.00	420.00
Conc mary in open cut	cy	300	90.00	100.00	800	80.00	91.00
Rubble mary & paving	cy	175	40.00	35.00	300	35.00	29.00
Pipe, vit, asb-cmt & CM	lf	7,000	3.00	4.00	15,000	3.00	2.66
Cr stone & gravel	cy	150	10.00	20.00	250	15.00	12.00
Portland cmt	bbl	200,000	5.75	5.00	450,000	4.75	4.94
Stl for reinf conc	lb	30,000	0.20	0.25	150,000	0.18	0.24
Met work, misc	lb	10,000	1.00	2.00	25,000	2.00	0.72
Pumpage, chlori & treat	m/mo	150	250.00	100.00	300	100.00	290.00
Liq chlor & alum sulphate	lb	15,000	0.20	0.70	50,000	0.70	0.19
Engr off & chlori houses	ls	job	65,000	119,000	job	130,000	196,752
Sanitary services	ls	job	40,000	166,000	job	181,000	52,000
Cleaning up	ls	job	20,000	20,000	job	40,000	76,900
Sink shaft 2 in rock & line with conc mary, 11" to A line	lf	......	......	......	43	1,600	952.00
2 Conc mary in plug & around pump wells in shaft 2	cy		......	......	650	35.00	81.00
Stnl stl pipe fit	lb	......	......	......	40,000	3.50	1.71

* mfg-million foot-gals m/mo machine-months
Time to complete: 60 months
Liquidated damages: $500 per day

Sewerage

Bargain Sewer in Louisiana

Bidding 21.5% below the nearest competition on one of these two contracts and almost 38% below on the other, W. R. Aldrich & Co. of Alexandria, Louisiana, took both contracts for a $1.6 million sewer system for Alexandria. Pan American Engineers, of Alexandria is the consultant.

The combination job includes 112,000 lin ft of vitrified clay and reinforced concrete sanitary sewers ranging from 8 in. to 54 in. in diameter in trench up to 22 ft deep. Tunnels under streets and railroad and channel crossings are other major operations.

The larger section, at $847,143 covers 62,000 lin ft of 8-in. to 54-in. sewer in trench up to 18 ft deep, 1,286 lin ft of 6-in. vitrified clay service lines, 330 lin ft of 36-in. to 48-in. pipe in 72-in. tunnel liner and two channel crossings.

The $775,197 section includes 50,000 lin ft of 8-in. to 48-in. sewer in trench with a maximum depth of 22 ft,

Continued on following page

Sewer, Louisiana

Continued from preceding page

6,000 lin ft of service lines, a 45-ft tunnel and two channel crossings.

Unit prices by size of pipe and depth of trench cover excavation and backfill, furnishing and laying pipe. The contract prices for vitrified clay pipe range from $3.50 per lin ft of 8-in. pipe in trench to 6 ft deep up to $36.00 per lin ft of 36-in. extra strong pipe in 20-ft to 22-ft trench. Reinforced concrete pipe ranges from $20.70 per lin ft of 42-in. pipe in 14-ft to 16-ft trench to $27.95 per lin ft of 54-in. pipe in 16-ft to 18-ft trench. Tunnel prices range from $190 per lin ft of 36-in. pipe in 72-in. liner to $275 for 48-in. pipe in 84-in. liner.

The bidding that produced such a wide spread between the two lowest bidders is in part on the 48-in. and 54-in. pipe.

Specifications require that concrete test at 3,000 lb per sq in. and that cast iron pipe applies to ASTM standards 150#.

Scheduled wage rates include $1.25 for common labor, $2.00 for semi-skilled, $2.90 for skilled labor and $3.00 for bricklayers.

The bidders include:

		Contr 1	Contr 2
1C	W. R. Aldrich & Co., Alexandria Louisiana	$847,143	$775,197
2	Barnet Brezner, Alexandria, Louisiana	1,078,078	
	Skilling & Boyd, Pineville, Louisiana		1,247,217
4	Pohlman & Wilbanks, Monroe, Louisiana		1,276,61
6	Pohlman & Wilbanks Monroe, Louisiana	1,246,367	

Bids: 9-18-56 Items	Unit	Contract 1 Quantity	Contract 1 Unit Prices 1C	Contract 1 Unit Prices 2	Contract 2 Quantity	Contract 2 Unit Prices 1C	Contract 2 Unit Prices 2
VCP, 8", 0-6' deep	lf	18,863	$3.50	$2.00	2,522	$3.50	$2.00
6-8'	lf	9,620	3.65	2.30	4,005	3.65	2.50
8-10'	lf	5,795	4.40	3.80	2,510	4.40	3.00
10-12'	lf	731	5.00	6.00	1,465	5.00	4.00
12-14'	lf	337	5.50	8.00	250	5.50	8.00
10", 6-8'	lf	600	3.15	2.60			
8-10'	lf	966	3.90	4.10	610	3.90	4.00
10-12'	lf	300	4.55	6.30			
12", 0-6'	lf				562	3.40	3.00
6-8'	lf	574	3.71	3.30	1,183	3.70	3.50
8-10'	lf				1,254	4.40	4.50
10-12'	lf	520	5.15	7.60	2,623	5.15	6.00
12-14'	lf	2,398	7.00	9.60	861	6.60	10.00
14-16'	lf	1,588	9.25	13.00	439	7.00	15.00
16-18' ext str	lf	200	11.75	20.00			
15", 8-10'	lf				2,301	6.90	10.00
10-12'	lf				4,516	7.75	15.00
12-14'	lf				6,054	9.35	20.00
14-16'	lf				2,624	9.85	24.00
18", 10-12'	lf	2,973	8.05	9.60			
12-14'	lf	2,144	8.45	13.00			
14-16'	lf	545	10.20	18.00	1,365	10.50	25.00
16-18' ext str	lf				902	11.75	30.00
21", 12-14'	lf	801	10.10	16.00			
14-16'	lf	975	11.85	18.50	156	12.00	27.00
24", 12-14'	lf				809	13.30	22.00
14-16'	lf				2,216	13.50	27.00
16-18'	lf				885	15.65	35.00
30", 16-18' ext str	lf	1,696	24.85	34.00			
36", 10-12'	lf	2,062	23.90	24.00	641	24.50	22.00
12-14'	lf				1,790	26.20	27.00
14-16'	lf				716	26.85	34.00
16-20' ext str	lf				1,816	35.00	46.00
20-22' ext str	lf				150	36.00	55.00
RCP, 42", 14-16'	lf				1,145	20.70	70.00
16-18'	lf				1,199	21.50	75.00
48", 10-12'	lf	163	22.55	26.00	2,560	22.00	65.00
12-14'	lf	1,512	24.05	35.00			
14-16'	lf	1,770	25.15	53.00			
16-18'	lf	350	25.90	63.00			
54", 14-16'	lf	1,426	27.40	58.00			
16-18'	lf	2,901	27.95	67.00			
Y, VC, 8x6"	ea	487	4.00	4.00	151	3.50	6.00
10x6"	ea	9	6.00	5.00			
12x6"	ea	15	7.80	8.00	85	7.75	10.00
15x6"	ea				100	16.85	20.00
18x6"	ea	34	26.00	23.00	20	26.15	26.00
21x6"	ea	12	35.00	30.00			
24x6"	ea				31	45.00	45.00
30x6"	ea	13	68.00	60.00			
36x6"	ea	4	92.00	90.00			
T, RC, 42x6"	ea				17	55.00	55.00
48x6"	ea	14	67.00	90.00	21	68.00	60.00
54x6"	ea	31	81.50	110.00			
Service lines, VC, verticl & horiztl 6"	lf	1,286	0.85	2.00	5,905	0.85	1.50
Plugs, VCP, 6"	ea	756	0.50	0.25	850	0.50	0.60
Bends ⅛, VC 6"	ea	247	1.50	1.00	812	1.50	1.50
90°, VC 6"	ea	146	1.50	1.00	425	1.50	1.50
Y, VC, 6x6"	ea	146	2.20	2.00	425	2.20	2.00
Manhole, sewer 4', 0-6' deep	ea	78	215.00	180.00	18	215.00	200.00
6-8'	ea	31	250.00	210.00	22	250.00	230.00
8-10'	ea	27	280.00	240.00	22	280.00	260.00
10-12'	ea	18	312.00	300.00	28	312.00	360.00
12-14'	ea	21	350.00	350.00	27	350.00	420.00
14-16'	ea	8	400.00	400.00	29	400.00	480.00
16-18'	ea	8	450.00	450.00	8	450.00	560.00
18-20'	ea				4	500.00	660.00
10-12'	ea	2	430.00	350.00	8	430.00	400.00
12-14'	ea	2	525.00	450.00			
14-16'	ea	5	600.00	500.00			
16-18'	ea	1	685.00	550.00			
6x6', 14-16'	ea	2	930.00	650.00			
16-18'	ea	5	965.00	700.00			
Manhole, drop 4', 8-10'	ea	2	300.00	300.00			
10-12'	ea	6	350.00	350.00			
12-14'	ea	2	400.00	400.00			
14-16'	ea	1	460.00	450.00	2	460.00	560.00
16-18'	ea	1	525.00	500.00			
18-20'	ea				4	565.00	740.00
5', 14-16'	ea	1	675.00	550.00			
16-18'	ea	1	690.00	600.00			
6x6', 14-16'	ea	3	1,030	720.00			
CIP, sewer, 8", 8-10' deep	lf	48	7.85	12.00			
12", 6-8'	lf	128	10.85	15.00	16	10.85	15.00
18", 10-12'	lf	32	17.00	20.00			
16-18'	lf				64	23.00	35.00
24", 12-14'	lf	32	26.50	32.00			
Conc, formed, "pier type" pipe, supports	cy	2	78.50	110.00			
Conc pipe collars	cy	11	60.00	60.00			
Conc collar for chimney support for line, 8"	ea	24	9.50	8.00	7	9.50	8.00
10"	ea	3	14.50	9.00			
12"	ea	15	21.25	10.00	43	21.25	8.00
15"	ea				100	22.50	8.00
18"	ea	34	23.65	14.00	20	23.65	18.00
21"	ea	12	28.50	17.00			
24"	ea				31	33.50	24.00
30"	ea	13	44.00	25.00			
36"	ea						
Remove existing sidewalk	sy				50	1.50	2.00
conc pav	sy	32	2.00	4.00	226	2.00	4.00
Conc sidewalk 4"	sy				50	4.00	5.00
6"	sy	32	6.00	5.00	226	6.00	8.00
7"	sy	32	7.00	6.00	226	7.00	9.00
Asphalt pav	sy	5,000	1.50	4.00	9,083	1.50	4.00
Sand clay gravel	cy	5,000	5.25	3.50	2,500	5.25	3.00
Selected sub-base matl	cy	600	7.25	6.00	500	7.25	5.00
Welded stl wire fabric	lb	126	0.30	0.20	880	0.30	0.25
Steel, reinf, deformed	lb	3,200	0.16	0.20	3,300	0.16	0.20
Pipe, 36", in 72" tunnel liner, Dallas St & Mo Pac RR	lf	125	190.00	150.00			
42", in 78" tun lin Sterkx-Atwood Rd & RR	lf				45	275.00	150.00
48", in 84" tun lin B'way & T&P RR	lf	55	240.00	150.00			
48", in 84" tun lin B'way & L&A RR	lf	50	250.00	150.00			
48", in 84" tun lin B'way & T&P RR	lf	100	234.00	150.00			
Conc, reinf "T" beam pipe support	cy	5.6	100.00	120.00	8.6	100.00	100.00
Sewer channel crossing, (B'way at Bayou Hinson)	ls	job	4,500	6,500			
(Willow Green River Rd & Chatlin Cake canal)	ls	job	10,000	10,500			
(Lee Street & Horseshoe drainage canal)	ls	job			job	5,500	5,200
(Sterkx Rd & Horseshoe drainage canal)	ls	job			job	7,500	5,200
Spec struc 36/48" junct (Dallas & B'way)	ls	job	1,200	2,500			
Conc slab	lf	50	7.00	6.00			
Conc bed support for VCP 8"	lf	1,030	1.30	3.00	325	1.30	1.00
10"	lf	300	1.45	3.00	100	1.45	1.00
12"	lf	1,190	1.60	3.00	1,715	1.60	1.40
15"	lf				7,950	1.90	1.40
18"	lf	1,136	1.75	3.00	464	2.10	1.50
21"	lf	50	2.30	3.00	350	2.30	2.00
24"	lf				800	2.65	2.25
30"	lf	675	2.75	4.00			
36"	lf	250	3.15	4.00	610	3.15	2.50
RCP 42"	lf	400	3.55	4.00			
48"	lf	715	4.30	5.00	475	4.30	2.50
54"	lf	2,650	5.00	5.00			
Sheet & brace support for VCP 8"	lf	1,030	3.60	4.00	325	3.60	2.00
10"	lf	300	3.75	4.00	100	3.75	2.00
12"	lf	1,190	4.00	4.00	1,715	4.00	2.00
15"	lf				7,950	4.10	2.00
18"	lf	1,136	4.40	4.00	464	4.40	3.00
21"	lf	50	5.30	5.00	350	5.30	3.00
24"	lf				800	6.00	3.00
27"	lf	675	6.15	5.00			
36"	lf	250	6.90	6.00	610	6.90	3.50
RCP 42"	lf	400	7.40	6.00			
48"	lf	715	7.90	7.00	475	7.90	4.00
54"	lf	2,650	8.65	7.00			

To be completed: 183 calendar days
Liquidated damages: $100 per day

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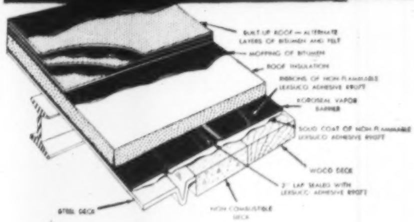
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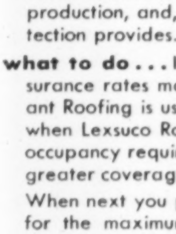

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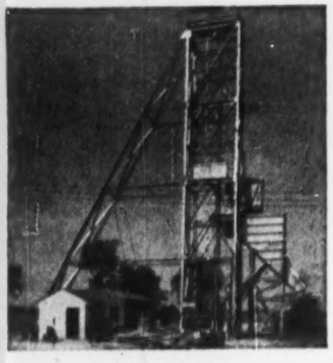

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Washington Sewer and Treatment Plant Extensions

Elma, Washington let this $106,321 contract to United Construction Co. of Olympia in three schedules: sewage treatment plant modificatoins with two lift stations, $39,747; 8,700 lin ft of 8-in. pumped outfall line $27,965, and 11,000 lin ft of 4-in. to 8-in. sewer pipe, $38,609. Howard T. Harstad & Associates of Seattle are consulting engineers.

Including 3½% sales tax, the whole job is $109,205, 10.5% below the engineers' estimate. The contract price is 22.1% below the only other bid on the entire project.

Treatment plant modifications, however, are 9.06% above the second bid. On one 8 x 8-ft lift station the alternate lump sum bid of $11,000 which took the contract compares with a $12,020 total for itemized bids on structure, pumps, electrical work, piping and plumbing.

The pumped outfall line at $27,965 is 10.7% below the second of six bids. Eight-in. class 1 asbestos cement pipe for $2.35 per lin ft took the contract away from the alternate for class 50 asbestos cement pipe priced $2.50 per lin ft. The class 1 bids range $2.00 to $2.52 per lin ft compared to $2.40 to $2.72 for class 50.

Excavation bids for trench over 6 ft deep and backfill range from 0.75 to $2.00 per lin ft.

The $38,609 sewer system with 11,000 lin ft pipe is 13.1% below the second low of six bids. Concrete or clay pipe will be installed, largely on un-cut roadway, thus unit prices include roadway grading costs.

A choice between rubber and hot poured bituminous joints drew equal bids from the contractor, $1.45 per lin ft for 4-in. pipe and joints, $1.50 per lin ft of 6-in. and $1.60 per lin ft of 8-in. pipe. The contract went to the rubber-joint alternate. Other bids range from $1.42 to $2.40 per lin ft of 8-in. pipe, $1.10 to $2.10 per lin ft of 6-in. pipe and $0.90 to $2.00 per lin ft of 4-in. pipe.

Excavation and backfill of sand and gravel is in ground which is expected to be dry even during wet weather. Priced by depth of trench, bids per lin ft range from $0.75 to $2.15 for trench 8 ft and less deep, from $1.00 to $2.25 for 8-ft to 10-ft trench, from $1.30 to $3.80 for 10 ft to 12-ft trench, from $1.55 to $6.00 for 12-ft to 14-ft trench and from $2.99 to $9.00 for 14-ft to 16-ft.

To establish rates for possible work changes, unit price bids were taken on forms, lining, reinforcing steel, excavation, concrete, cast iron pipe, manholes and incidental items.

Class B concrete must test at 3,000 lb per sq in., class C concrete at 2,500 lb per sq in. and class D concrete at 2,000 lb per sq in.

The prevailing wage rates shown are an estimate of the range of union scales for a project of this type. They include $3.10 lb for skilled labor, $2.85 for semi-skilled labor and $2.35 for common labor.

Sewer and treatment plant must be in operation after 100 calendar days. Thirty additional days are allowed for the clean-up. Liquidated damages amount to $10 per day plus all extra expenses.

Bidders on the three schedules include.

Sewcge Treatment Plant Modification

1	Ace Construction Co., Seattle, Wash	$36,443
2C	United Construction Co., Olympia, Wash	39,747

Bids: 9-10-56 Items and Quantities	Lump Sum 2C	% of 2C Total	Lump Sum 1
Excavation & finish grading	$1,000	2.52	$760
Borrow, common, haul & place, 200 cy *	350	0.88	600
Gravel fill, h&p, 50 cy *	100	0.25	250
Effluent lift station struct	2,000	5.03	2,400
Effluent lift pump, 1 ea	1,200	3.02	1,845
Motor control valve, 6", 1 ea	1,500	3.77	1,925
Spray system	1,500	3.77	1,801
Sludge circ well struc	600	1.51	970
pump, 1 ea	1,000	2.52	1,200
Deflector cone, f&i	800	2.01	430
Existing tank, dewater & patch as required	3,000	7.55	880
Bar screen & grit chamber, f&i	1,000	2.52	455
Sludge dry bed retain wall & sand bed	1,200	3.02	1,474
cov struct	1,800	4.53	3,010
Gravel, bedding, 50 cy *	150	0.38	250
Painting, architectural	1,000	2.52	456
Electrical	3,000	7.55	4,100
Piping & plumbing	6,000	15.09	5,387
Miscellaneous	1,547	3.89	1,300
Subtotal	$28,747	72.33	$29,467
Sewage lift station, complete & in operation, 8x8' inside dimension	11,000	27.67	6,976
Totals	$39,747	100.00%	$36,443
Lift Station No. 1			
Lift station structure	2,220	......	1,700
Sewage lift pumps, 2 ea	3,000	......	2,800
Electrical	4,000	......	235
Piping & plumbing	2,800	......	2,241
Subtotals for Lift Station No. 1	12,020	......	6,276

*Unit Prices Items	Unit	Quantity	Unit Prices 2C	Unit Prices 1
Borrow, common, h&p	cy	200	$1.75	$3.00
Gravel fill, h&p	cy	50	2.00	5.00
Gravel, bedding	cy	50	3.00	5.00

Pumped Outfall Line

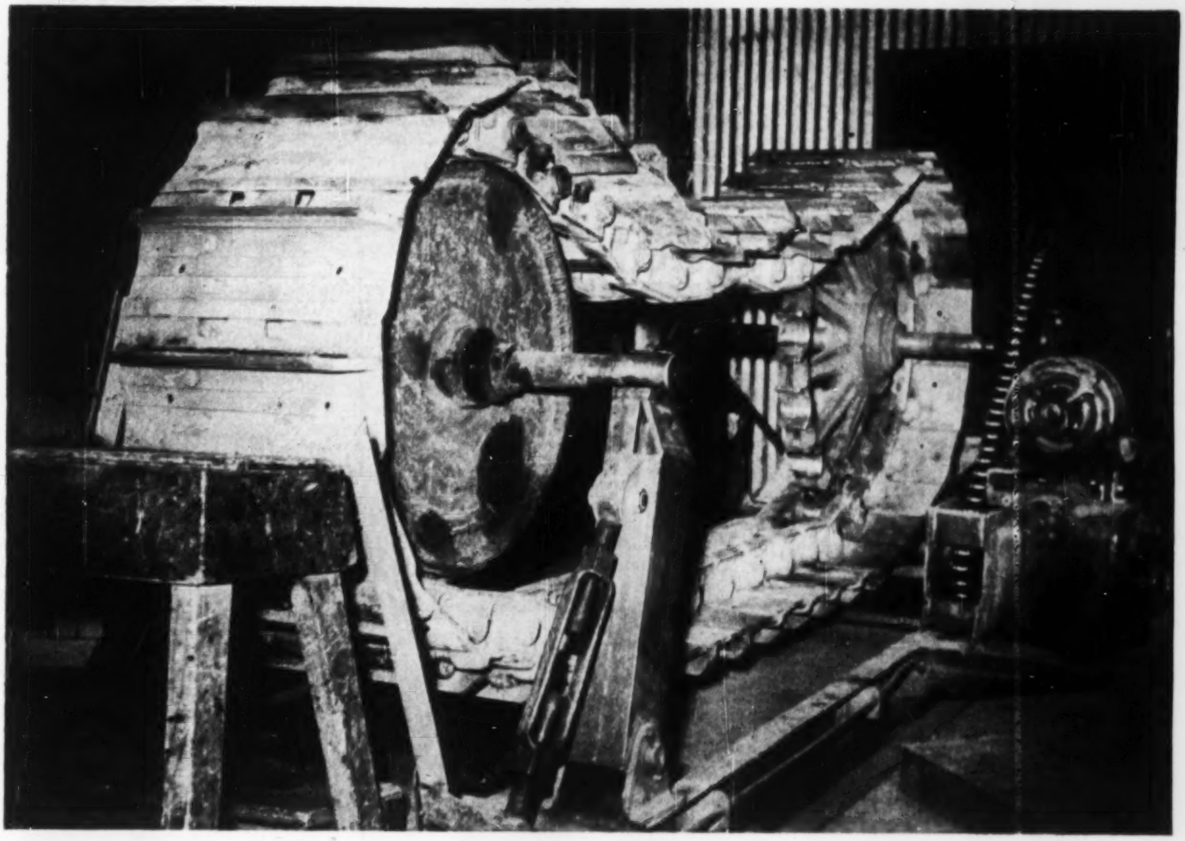
1C	United Constr. Co., Olympia, Wash	$27,965
2	Tom Tonnesen, Tacoma, Wash	31,321
6	Utility Constr. Co., Tacoma, Wash	42,935

Bids: 9-10-56 Items	Unit	Quantity	Unit Prices 1C	Unit Prices 2
Exc, trench bkfl	lf	8,700	$0.75	$1.00
ACP, cl 50, 8", f&i	lf	8,500	2.50	2.40
Alternate (Contract)				
ACP, cl 1, 8", f&i	lf	8,500	2.35	2.20
CIP, met jt, cl 50, 8", f&i	lf	200	3.50	4.30
Fittings, CI, f&i	lb	1,600	0.50	0.36
Blocking, conc, f&i	ea	13	5.00	15.00
Sand, bedding, f&p	cy	50	3.00	10.00
Grav, fndn, f&p	cy	50	3.00	10.00
Air relief vlv, 2", f&i	ea	2	200.00	150.00
Outfall anchor block, f&i	ls	job	200.00	100.00
Total with cl 50 ACP			$49,215	$50,021

Sanitary Sewer

1C	United Const. Co., Olympia, Wash	$38,609
2	Jack Roberson, Inc., Ephrata, Wash	44,391
6	Ace Constr. Co., Seattle, Wash	61,176

Continued on page 234



Positioning Fixture for REBUILDING and HARD-FACING TRACTOR GROUSERS

With spreads operating throughout the Western States from New Mexico to Washington, the Isbell Construction Co. with its head office in Reno has complete facilities for maintenance of heavy earth working equipment at its home base. A fixture for positioning crawler track assemblies to speed the repair of grousers is so ingenious as to have attracted wide attention.

In order to keep their tractors moving, the shop has in stock spare tracks for replacement; when grousers are worn, the track is taken off the crawler and sent to the shops, the replacement assembly is supplied and the tractor goes back to work. The old track is mounted on the fixture shown above and, as time permits, the shop weldors handle the rebuilding job. The fixture has a conventional idler and sprocket on which the track is mounted, the device being adjustable to handle a track assembly of varying length. The sprocket is power driven through a gear reducer.

The assembly is rotated so that a weldor can work on grousers at either end, welding in down hand position. The worn grouser is squared up by a cutting torch and steel bar stock, ½" x 1¼", is welded on with high tensile electrodes. After the bar is welded in position a single heavy stringer bead of Stoody Self-Hardening is run across the top to give it extra wear protection.

The company has found that this fixture cuts welding time in half, simplifies handling of the track assembly and the use of hard-facing alloys stretches out service life between track overhauls.

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SUCH A "MAN" IS ON YOUR PAYROLL. Be sure to "listen" regularly and carefully to the practical business information he gathers.

McGRAW-HILL PUBLICATIONS

Washington Sewer

Continued from page 232

Bids: 9-10-56 Items	Unit	Quantity	Unit Prices 1C	2
Trench, exc & bkfl,				
8′ or less	lf	4,400	$0.75	$1.69
8 to 10′	lf	4,100	1.00	1.84
10 to 12′	lf	1,200	1.30	2.18
12 to 14′	lf	140	1.55	2.56
14 to 16′	lf	60	1.80	2.99
side sew, any depth	lf	1,000	2.50	1.00
Sew pipe, rubb, jt, conc or clay, 8″ *	lf	7,200	1.60	1.42
6″ *	lf	3,400	1.50	1.10
4″ *	lf	400	1.45	0.90
Pressure line, AC, cl 50, 4″	lf	340	1.50	1.68
MH, std, basic to 8′	ea	24	200.00	270.00
drop, basic to 8′	ea	1	250.00	315.00
additional depth	lf	33	18.00	18.70
existing, modify	ea	2	150.00	25.00
Lamphole, std, any depth	ea	12	75.00	50.00
Y, conc or clay, 8x6″	ea	20	7.00	13.00
8x4″	ea	20	7.00	13.00
6x6″	ea	20	7.00	11.00
6x4″	ea	20	7.00	11.00
Plug, conc or clay	ea	120	0.50	0.75
Grav, bedd, where required	cy	200	3.00	2.50
Encasemt, conc, where required	cy	20	40.00	25.00
Standard service	ea	10	25.00	25.00
*Alternate				
Pipe, conc or clay, JC joints				
8″	lf	7,200	1.60	1.17
6″	lf	3,400	1.50	1.00
4″	lf	400	1.45	0.85

° JC—Hot poured bit joints using a compound equal to JC 60.

Possible Work Changes

Bids: 9-10-56 Items	Unit	Unit Prices 1C	2*
Forms, conc, contact area	sf	$1.50	$0.45
Form lining, masonite, cont area	sf	0.75	0.75
plywood, contact area	sf	0.60	0.60
Steel, reinf, ip	lb	0.15	0.14
Conc, cl B, 3,000 psi, ip	cy	100.00	60.00
cl C, 2,500 psi	cy	75.00	50.00
cl D, 2,000 psi	cy	60.00	40.00
Excavation, common	cy	2.00	5.00
rock	cy	20.00	20.00
CIP, met jt, cl 50 8″, ip	lf	6.00	6.00
6″, ip	lf	5.00	5.00
4″, ip	lf	4.00	4.00
Crushed rock, road sub-base	cy	3.00	5.00
MH, std, 48″, basic to 8′	ea	190.00	252.00
drop, 48″, basic to 8′	ea	210.00	320.00
48″, additional depth	lf	15.00	15.00

* Ace Const. Co.

Massachusetts Trunk Sewer Includes Tunnel Alternates

The low of six bids on this 9,400-lin ft trunk sewer is based on concrete pipe priced $32.00 per lin ft in the 200-lin ft tunnel. This is 75% below the alternate for precast reinforced concrete pipe which drew only two bids, $140.00 from the low bidder and $40.00 from the other.

This is the first of six contracts for a $1.5 million sewer project to connect the town system of Randolph, Massachusetts, to the Metropolitan District Commissions Sewer. Duffill Associates, Inc., Boston, Mass., are consulting engineers for the town of Randolph.

The $410,238 low bid from Pacella Brothers, Inc., Dendham, Mass., is only 0.2% below the second low bid. It is 4.95% below the engineers' estimate. The contract has not been awarded as this is written.

Most of this 24-in. to 33-in. reinforced concrete pipe sewer will be laid in trench at depths under 12 ft but 6½% of the trench excavation is in depths of 24 ft or more.

The low bidder's unit prices are low on excavation but high on pipe. For example, he bid $2.20/cu yd on earth excavation under 12 ft against a range of $5.00 to $23.00 per cu yd from other bidders. At 12-ft to 24-ft depths, he bid $5.30 against $10.00 to $18.00 from the competition and for trench more than 24 ft deep he bid $7.20 against $15.00 to $25.00 per cu yd.

Rock excavation pulled a wide price range, but quantities are too small to affect the outcome of the bidding.

On the pipe Pacella Brothers' prices are much higher than the other bids. Their $18.00 per lin ft for 24-in. pipe compares with $10.00 to $15.00 from the other bidders. On the 30-in. pipe the contract price of $22.00 per lin ft compares with a range of $11.00 to $17.00 and on the 33-in. pipe the contractor's $30.50 per lin ft compares with $12.00 to $18.00 from the competition.

Specifications under this contract require that class A concrete have a cement content of six bags per cu yd and a compressive strength of 3,000 lb per sq in.

Wage rates include $2.25 for common labor, $2.75 for semi-skilled and $3.50 for skilled labor.

The six bidders on this municipal project include:

1C	Pacella Bros., Inc., Dendham, Mass	$410,238
2	Donoghue & Bartels, Inc	411,010
6	Civatarese Piatelli Const. Co	792,330
EE	Duffill Associates, Inc., Boston, Mass	431,635

Bids: 9-20-56 Items	Unit	Quantity	Unit Prices 1C	2C
Steel liner plate	lf	200	$63.00	$50.00
Pipe, conc tunnel	lf	200	32.00	55.00
Alt, RCP, precast, ellipt	lf	200	140.00	
RCP, prec, 24″	lf	2,985	18.00	10.00
30″	lf	1,120	22.00	12.00
33″	lf	5,075	30.50	14.00
Underdrain, std	lf	500	6.00	10.00
MH, walls, prec conc blk	vf	100	25.00	45.00
prec conc pipe	vf	250	32.00	30.00
bases, reg	ea	6	200.00	60.00
specl	ea	18	400.00	120.00
& chambers	ea	6	600.00	2,000.00
frame & cover	set	30	60.00	60.00
Steps, cast iron	ea	100	3.00	5.00
Exc & bk fl earth, under 12′	cy	19,200	2.20	6.00
12-24′	cy	7,700	5.30	10.00
over 24′	cy	1,850	7.20	15.00
rock, under 12′	cy	10	12.00	50.00
12-24′	cy	10	20.00	60.00
over 24′	cy	10	32.00	80.00
Exc, below grade	cy	100	8.00	15.00
tunnel earth	cy	140	128.00	40.00
rock	cy	10	100.00	80.00
Borrow, gravel	cy	100	6.00	5.00
Encasement, conc	cy	50	73.00	50.00
Resurf, roads	sy	100	2.00	4.00
Timber sheeting lip	Mfbm	25	300.00	300.00
Drop manholes	vf	30	60.00	40.00

Bargain Bids on Sanitary Sewer in Minnesota

At a price of 16.8% below the second low bid and 35.4% below the engineers' estimate, Rupp Construction Co., Slayton, Minnesota, will extend the village sanitary sewer system of Mountain Lake, Minn. Associated Consultants, Minneapolis, Minn., are consulting engineers.

This $50,409 contract includes 15,000 lin ft of 8-in. to 18-in. vitrified clay pipe in trench with a maximum depth of 20 ft, 42 manholes, a lamphole and connections. Also included in the contract price are 1,740 ft of additional clap pipe and 60 ft of class 150 cast iron pipe. Bids were taken on the removal of 40 trees and rock excavation, but the amounts are not included in the contract.

Sewer is priced per lin ft and depth of excavation. The contractor's prices range from $1.70 per lin ft of 8-in. pipe in trench with a maximum depth of 8 ft to $12.50 per lin ft of 18-in. pipe in 18-ft to 20-ft cut.

Work started on November 1, 1956 and is scheduled to be completed in exactly one year.

The 13 bidders include:

1C	Rupp Constr, Co., Slayton, Minn	$50,410
2	William Ferguson, Metchell, South Dakota	60,587
14	Everett Casper, Grand Rapids, Minn.	99,703
EE	Associated Consultants, Minneapolis, Minn.	78,000

Bids: 10-22-56 Items	Unit	Quantity	Unit Prices 1 C	2
VCP, 8", 0-8' cut	lf	1,255	$1.70	$2.13
8-10' cut	lf	985	1.90	2.38
10-12' cut	lf	790	2.20	2.68
12-14' cut	lf	300	2.50	3.08
UCP 10", 0-8' cut	lf	150	2.00	2.38
8-10' cut	lf	275	2.15	2.62
10-12" cut	lf	425	2.30	2.92
12-14' cut	lf	565	2.45	3.32
14-16' cut	lf	340	2.60	3.82
12", 0-8' cut	lf	1,275	2.15	2.63
8-10' cut	lf	2,755	2.30	2.88
10-12' cut	lf	1,275	2.65	3.18
12-14' cut	lf	1,060	2.80	3.58
14-18' cut	lf	590	3.10	4.08
16-18' cut	lf	190	6.05	5.58
18', 0-8' cut	lf	605	4.00	4.30
8-10' cut	lf	955	4.25	4.50
10-12'	lf	735	4.55	4.90
12-14' cut	lf	190	5.00	5.75
14-16' cut	lf	80	5.30	6.25
16-18' cut	lf	25	8.50	7.75
18-20' cut	lf	25	12.50	8.75
Manholes	ea	42	135.00	175.00
depth over 8'	lf	110	11.00	15.00
Lamphole, 12"	ea	1	100.00	75.00
Branches, "Y", 8"x6"	ea	60	3.00	3.00
10"x6"	ea	15	3.10	5.00
12"x6"	ea	80	5.00	7.00
Open ditch 520 ft	ls	job	1.00	1.00
Reinf slab 60 sf, 8" thick	ls	job	230.00	100.00
Subtotal			49,352	59,430
Additional costs				
VCP, 8"	lf	300	0.20	0.20
10"	lf	340	0.20	0.30
12"	lf	780	0.30	0.43
18"	lf	320	0.40	1.00
CIP, 8"	lf	40	5.20	3.00
10"	lf	20	8.00	5.00
12"	lf	20	10.00	6.00
Subtotal			1,058	1,157
Items not included in contract				
Excav rock	cy	25	30.00	32.50
Remove trees, 8"	ea	40	10.00	35.00

Waterworks

California's Central Valley Waterworks Comes High

This water system to supply 90 dwellings, 40 trailer houses, an administrative building, garage and warehouse in Lewiston, California, drew only two bids, a low of $111,202 and a high of $137,973. The engineer's estimate was $59,885 for a job uncomplicated and without any unusual conditions that would account for the wide spread in pricing. This water supply system is to serve the Government Community on the Trinity River Division of the Central Valley Project for the Bureau of Reclamation. L. B. Ackerman is project construction engineer with office at Weaverville.

The job includes construction of an infiltration gallery and pumpwell, furnishing and installation of 4,000 lin ft of 6-in. water supply pipe, erection of a small chlorination building, installation of government-furnished chlorinator, furnishing and installing two pumping units, each capable of delivering 1,809 gal per min at 400-ft head, and furnishing and installation of electrical equipment. The contractor must furnish all material except the chlorinator.

The low bidders are Ince Brothers and Peninsula Pipe Line, Inc. of Sunnyvale, Calif. Their bid tops the engineer's estimate by 85% but is 19.4% under the other bid. The contract has not been awarded as this is written.

The low bidder's prices for excavation, $7.00 per cu yd for gallery and well and $2.00 per cu yd of pipe trench plus backfill, compare to an estimate of $1.50 per cu yd for both. The $11,000 lump sum bid on the two pumping units compares to an estimated $4,650. Control cable priced $3.50 per lin ft, this is $19,950 for the total 5,700 lin ft, is high above the estimated $0.50 per lin ft or $2,850 for the total.

Cast iron pipe must conform to ASTM standards WW-P-421a, class 25.

Scheduled wage rates are $3.00 for skilled labor, $2.575 for semi-skilled and $2.325 for common labor.

The two bidders and their prices are:

1	Ince Bros. & Peninsula Pipe Line Inc., Sunnyvale, California	$111,202
2	Barry J. Richards Company, Studio City, California	137,973
EE	Bureau of Reclamation, Weaverville, California	59,885

Bids: 10-23-56 Items	Unit	Quantity	Unit Prices 1	2
Excav for infiltration gallery & pump well	cy	2,900	$7.00	$17.00
Backfill	cy	1,450	2.00	2.25
Excav & bkfl of pipe trenches	lf	4,000	2.00	2.05
Sand & grav & pit-run grav in infiltrn gallery, f&p	cy	1,400	8.00	8.50
CMP, 18" pert f&p	lf	80	10.00	14.00
78" f&p	lf	30	70.00	72.00
Chlorination bldg, f&e	ls	job	3,500	3,100
Motor driven submersible type pump units, 2, f&i	ls	job	11,000	9,400
Install chlorinator, & f&i piping & chlorination equip	ls	job	2,500	2,300
Metalwork, conc for pump well, piping, f&i	ls	job	7,500	6,400
Water supply pipe, 6" fitgs, valv, valv box assembly, f&i	lf	4,000	3.90	3.60
Elec installs, f&i	ls	job	3,876	3,640
Control cable, f&i	lf	5,700	3.50	3.70
Pump discharge valvs, 2, & 2 valv oper sys, f&i	ls	job	1,976	1,700

Time to complete: 120 calendar days
Liquidated damages: $50.00 per day

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Air Fields

Ramps and Service Ways at Dallas' Love Field

Five contractors competed on October 23 for the ramp around the new terminal building, service roads, taxiways and runway extension at Love Field Airport for the City of Dallas, Texas. Flenniken Construction Co. and L. H. Lacy Co. took the contract with a $4,928,686 low bid, 3.5% above the engineers' estimate but 2.3% below the second bid. Forrest and Cotton, Dallas, are consultants.

Work is in these five sections:

A . . . the ramp around the new terminal building (ENR, Sept. 29, 1955, p. 212 for unit prices) service road and parking lot for 1,700 cars.

B . . . a new taxiway parallel to the existing runways.

C . . . a new hangar taxiway.

D . . . N.S. runway extension.

E . . . canopy and lighting for a concrete walkway.

On each of the sections A to D bids cover site preparation, grading and finish, drainage, paving and its own lighting system.

The work lines up like this:

	Contract price	%	R/W Paving—plain concrete hot asphaltic binder & surface
A	$3,215,307	65.2	323,000 sy, 13-in., 10-in., 17 in.
B	701,209	14.2	103,000 sy, 13-in., 10-in.
C	313,696	6.4	32,000 sy, 10 in., 13-in.
D	653,915	13.3	42,000 sy, 10-in.
E	44,560	0.9	. . . .

Gravel for subbase and crushed stone for the base course will be used. Drainage requires reinforced concrete pipe, 15 in. to 78 in. in diameter.

Section A includes also 69,000 sq yd of 6-in. reinforced concrete pavement.

The parking area surface will be of 6-in. hot mix asphaltic concrete.

Alternate bids at 9% higher cost called for reinforced concrete pavement and different curbs and median strips.

Section C includes 27,000 sq ft 8-in. reinforced concrete pavement.

Specifications require 5.2 sacks of cement per cu yd of concrete which must test at a flexural strength of 650 lb per sq in. in 28 days.

Mechanical-joint cast iron pipe must comply with ASTM standards ASA A21.11.

Wage rates to be paid under this contract range from $1.00 for common labor, $1.375 for semi-skilled to $1.625 for skilled labor.

The bidders include:

1C	Flenniken Const. Co., Shreveport, La., L. H. Lacy Co., Dallas, Texas	$4,928,686
2	Tecon Corp., Dallas, Texas	5,046,539
5	H. B. Zachry Co., San Antonio, Texas	5,466,269
EE	Forrest & Cotton, Dallas, Texas	4,762,397

Part A—Site, Preparation, Grading & Finish

Bids: 10-23-56 Items	Unit	Quantity	Umit 1C	Prices 2
Site preparation	ls	1	$262,500	$200,000
Excav airfield	cy	48,496	0.63	0.50
roadway	cy	56,849	0.63	0.50
drain ditch	cy	15,042	0.63	0.55
Tillage	ac	198	7.50	7.50
Fertilizing	ac	198	30.00	35.00
Sprigging	ac	167	75.00	75.00
Spot Sodding	sy	153,332	0.09	09
Solid Sodding	sy	78	3.00	3.00
Watering	Mgal	5,940	1.20	1.20
Fence smooth wire boundary	lf	2,530	0.25	0.25
chain link 5'	lf	12,715	1.38	1.40
Guard fence, remov & relocat', stl plate	ls	1	1,500	1,500
Subtotal			399,135	322,981

Drainage

RCP std str, 15"	lf	2,094	4.50	4.15
18"	lf	1,184	4.80	4.50
21"	lf	714	5.10	5.15
24"	lf	934	5.75	5.75
30"	lf	574	6.50	7.00
36"	lf	968	8.15	9.50
42"	lf	192	9.75	11.25
48"	lf	624	12.00	13.00
60"	lf	1,656	17.00	18.50
66"	lf	1,710	21.00	25.75
78"	lf	580	27.50	35.00
Bkfl, grav, cmt stab	cy	1,956	12.00	12.25
Inlet, type A	ea	6	200.00	325.00
B	ea	1	400.00	500.00
C	ea	110	100.00	67.00
std curb 5'	ea	28	225.00	200.00
8'	ea	2	300.00	232.00
std type Y	ea	1	160.00	155.00
Junction struct type C	ea	42	125.00	175.00
MH, std 5'	ea	8	225.00	232.00
type A	ea	1	1,500	1,100
B	ea	4	1,000	725.00
Conduit, RC, 3' wide	lf	2,032	55.60	56.25
3'—3'6"	lf	50	58.70	60.50
3'6"	lf	775	55.30	57.00
3'6"—4' wide	lf	50	56.75	58.50
4" wide	lf	500	58.00	60.00
4'6"	lf	25	60.00	62.00
4'6"	lf	225	63.00	65.00
4'6"—5'0"	lf	25	64.00	66.00
5'	lf	298	67.00	69.00
CIP sewer 8"	lf	746	6.00	7.00
16" with supports	lf	16	14.00	13.50
Headwall reinf conc 18"	ea	2	170.00	115.00
78"	ea	1	1,800	925.00
Storm sewer pipe, exist, inspect & bkfl	lf	450	4.50	4.65
Inlet, exist, remov	ea	38	50.00	77.50
cap	ea	9	45.00	31.00
MH, exist, cap	ea	5	50.00	31.00
Connect to exist inlet	ea	1	25.00	46.50
to exist storm sewer line	ea	9	35.00	31.00
to exist MH	ea	2	30.00	46.50
MH or inlet, raise	ea	1	150.00	31.00
lower	ea	1	25.00	51.50
Box culv, RC, 2—9' x 6'	lf	468	78.60	81.00
Headwall reinf conc for 2—9' x 6' MBC	ls	1	1,570	1,600
Underground sprinkler system	ls	1	9,700	6,500
Subtotal			468,017	485,512

Paving

Subbase, grav	cy	76,819	2.17	2.55
Base crushed stone	cy	4,244	6.02	7.00
Pav reinf conc 8"	sy	68,536	3.43	3.20
Pav, unreinf conc 10"	sy	3,668	3.81	3.50
13"	sy	317,634	4.10	4.60
17"	sy	1,306	5.46	6.00
Integral curb roadway 6"-variable height	lf	26,368	0.31	0.50
Median strip roadway conc 4"	sf	678	0.34	0.35
Walkway, parking area, conc 5"	ls	1	12,400	8,500
Bit tack coat ramp	gal	2,101	0.18	0.24
Pvmt, hot mix asph conc, binder crse, airfield	t	2,403	7.00	6.37
surf crse, airfield	t	1,287	7.00	6.15
3", airfield serv road	sy	3,913	1.10	1.20
Ground rods	ea	156	30.00	25.00
Striping, runway	sf	2,927	0.04	0.04
taxiway	sf	2,328	0.04	0.04
Numerals, runway	sf	1,344	0.04	0.04
Runway & taxiway marking obliterat	sf	2,016	0.04	0.04
Fndn. conc, for mast arm, 10'	ea	1	50.00	35.00
20' or 30'	ea	2	80.00	60.00
Pave leaveout for vehicle detectors	ea	1	22.00	150.00
Found, conc for type M controller CAB	ea	1	80.00	80.00
Conduit, galv 2"	lf	65	1.50	2.00
galv 3"	lf	171	2.00	3.00
Barrier buttons	ea	20	5.87	15.00
Entrance marking	ls	1	8,000	7,500
Striping, parking area	sf	23,095	0.75	0.08
Signs, parking bay	ls	1	8,000	3,000
Median strip conc, 4" limousine parking area	sf	3,716	0.34	0.35
Pvmt, hot mix asph, conc, parking area 6" *	sy	13,915	2.10	1.91
Islands & median strips, conc, parking area *	cy	1,676	17.60	26.00
Curb & 24" gutter, conc, parking area *	lf	5,656	1.56	1.50
Subtotal			2,020,478	2,189,504
* Alternate:				
Pvmt, reinf conc, 6", parking area	sy	66,951	2.63	. . . .
Integral curb, 6" variable height, parking area	lf	29,651	0.31	. . . .
Median strip, conc, 4" parking area	sf	80,532	0.34	. . . .
Subtotal with alternate paving			2,039,590	. . . .

Lighting

Airport cable trench	lf	18,410	0.32	0.27
duct, undergr, 2-way	lf	2,865	3.15	3.90
4-way	lf	160	5.25	5.60
6-way	lf	650	7.35	7.25
10-way	lf	170	10.85	11.75
12-way	lf	1,000	12.60	12.70
boring, 2-way	lf	330	26.25	25.20
4-way	lf	405	31.50	30.30
8-way	lf	480	42.00	36.50
Airport cable tunnel	ls	1	45,700	39,000
cable handholes, dual	ea	4	730.80	520.00
single	ea	4	365.40	260.00
MH	ea	2	1,096	220.00
Airport cable 1/C #10 use, RR 3kv tetrahedron in trench	lf	5,940	0.17	0.32
1/C #8 use, RR 3kv, in trench	lf	32,255	0.20	0.37
1/C #6 use, RR 3kv, tetrahedron in trench	lf	150	0.26	0.50
14/C #10, use RR 3kv tetrahedron in trench	lf	3,550	1.95	2.40
1/C #10, use RR 3kv tetrahedron in duct	lf	660	0.17	0.34
1/C #8 use, RR 3kv, in duct	lf	7,250	0.20	0.40
14/C #10 use, RR 3kv, tetrahedron in duct	lf	660	1.94	2.60
1/C #10 use, RR 3kv, tetrahedron in tunnel	lf	1,100	0.17	0.37
1/C #8 use, RR 3kv, in tunnel	lf	1,200	0.20	0.42
14/C #1C use, RR 3kv, tetrahedron in tunnel	lf	1,100	1.95	3.00
1/C #6 use, RR 3kv, power room to vaults	lf	4,990	0.28	0.57
16/C #10, 600v tetrahedron N vault to tower	lf	1,110	1.68	2.84
12/C #12, 600v W vault to tower	lf	865	1.13	2.40
20/C #12, 600v N vault to tower	lf	1,110	1.68	3.30
22/C #12, 600v, N vault to tower	lf	1,110	1.84	3.70
Lights, med intensity, salvage	ea	10	25.58	120.00
runway	ea	56	95.24	133.00
taxiway	ea	75	95.24	142.00
Airport vault, north pier	ls	1	10,052	13,000
west pier	ls	1	8,800	12,000
Power supply & distrib vaults & tunnel	ls	1	11,900	18,000
Tunnel lighting	ls	1	1,250	1,500
Tetrahedron & transformer relocation	ls	1	9,330	1,000
Relocating exist vault & tower equip	ls	1	970.00	13,000
Power supply & distrib equip	ls	1	13,400	6,500
Trenching	lf	12,125	0.31	0.27
Conduit heavy transit 4"	lf	7,320	1.05	1.10
Cable 1/C #1, RR 3,000v in trench	lf	23,140	0.61	1.08
in cond	lf	6,360	0.66	1.20
#6 3,000v, in trench	lf	8,920	0.26	0.50
in cond	lf	2,880	0.28	0.52
Transformer vaults, semi-buried, complete	ea	10	930.00	260.00
Handholes, electrical	ea	2	350.00	270.00
Lights single	ea	80	494.50	625.00
Lights double	ea	39	682.00	870.00
Transite cond, hvy, 3"	lf	570	0.67	3.40
Subtotal			327,676	387,655
Total Part A			3,215,307	3,385,651

Continued on following page

Ramps and Service Ways at Dallas' Love Field

Continued from preceding page

Bids: 10-23-56 Items	Unit	Quantity	Unit 1C	Prices 2
Part B—Site Preparation, Grading and Finish				
Site preparation	ls	1	1,000	1,000
Excav airfield	cy	130,107	0.63	0.50
Tillage	ac	45	7.50	7.50
Fertilizing	ac	45	30.00	35.00
Sprigging	ac	45	75.00	75.00
Sodding, solid	sy	16	3.00	3.00
Watering	Mgal	1,350	1.20	1.20
Blast fence, erect	ls	1	12,500	13,500
Subtotal			102,198	95,509
Drainage				
RCP std str 15"	lf	958	4.50	3.60
18"	lf	204	4.80	4.15
21"	lf	1,182	5.10	4.90
24"	lf	1,332	5.75	6.15
30"	lf	1,344	6.50	7.10
36"	lf	496	8.15	8.75
66"	lf	80	21.00	25.00
Bkfl, cement stab grav.	cy	591	12.00	12.25
Inlet, type A	ea	10	200.00	340.00
type B	ea	4	400.00	525.00
Headwall, reinf conc, 24"	ea	1	250.00	175.00
Remov exist inlet	ea	9	50.00	77.50
Cap exist inlet	ea	7	45.00	31.00
MH	ea	3	50.00	31.00
Conn to exist inlet	ea	3	25.00	46.50
to storm sewer line	ea	3	35.00	31.00
to exist MH	ea	1	30.00	46.50
Lower exist MH or inlet	ea	4	25.00	51.50
Subtotal			45,603	48,569
Paving				
Gravel subbase	cy	23,779	2.17	2.55
Crushed stone base	cy	3,397	6.02	7.00
Pvmt, unreinf conc, 10"	sy	1,300	3.81	3.70
13"	sy	101,787	4.10	4.60
Bit tack coat, ramp	gal	850	0.18	0.24
Pvmt, hot mix asph conc, binder crse, airfield	t	776	7.00	6.37
surf crse	t	542	7.00	6.15
Taxiway striping	sf	6,132	0.04	0.04
Subtotal			503,954	566,171
Lighting				
Airport cable trench	lf	24,740	0.32	0.27
Duct, underground, 1-way	lf	120	2.20	3.00
2-way	lf	1,425	3.15	3.90
4-way	lf	170	5.25	5.60
6-way	lf	85	7.35	7.25
8-way	lf	170	9.16	9.75
Airport cable 1/C /8 use, RR, 3kv, in trench	lf	57,300	0.20	0.37
in duct	lf	7,375	0.20	0.40
in tunnel	lf	12,000	0.20	0.42
High intensity lights, R/W relocat	ea	26	73.00	250.00
Medium intensity lights, taxiway	ea	173	95.24	142.00
Subtotal			49,454	76,080
Total Part B			701,209	786,329
Part C—Site Preparation, Grading and Finish				
Site preparation	ls	1	2,500	7,500
Excav, airfield	cy	19,683	0.63	0.50
Embank, compacted earth, airfield	cy	15,400	0.63	0.40
Excav, roadway	cy	19,845	0.63	0.50
Tillage	ac	36	7.50	7.50
Fertilizing	ac	36	30.00	35.00
Sprigging	ac	36	75.00	75.00
Solid sodding	sy	3	3.00	3.00
Watering	Mgal	1,080	1.20	1.20
Subtotal			42,460	38,959
Drainage				
RCP, std str 15"	lf	1,356	4.50	3.85
18"	lf	1,940	4.80	4.25
21"	lf	214	5.10	5.15
24"	lf	640	5.75	6.00
27"	lf	308	6.25	8.25
30"	lf	74	6.50	9.75
Bkfl, cement stabilized gravel	cy	112	12.00	12.25
Inlet type A	ea	18	200.00	325.00
Curb inlet, std, 5'	ea	4	225.00	200.00
Y inlet, std type	ea	2	160.00	155.00
Headwal, RC, 18"	ea	1	170.00	115.00
Remov exist inlet	ea	12	50.00	77.50
Cap exist inlet	ea	5	45.00	31.50
Connect exist inlet	ea	4	25.00	46.50
exist storm sewer line	ea	7	35.00	30.00
exist MH	ea	1	30.00	30.00
Subtotal			30,125	31,631
Paving				
Gravel subbase	cy	9,585	2.17	2.55
Pvmt, reinf conc, 8"	sy	26,678	3.43	3.30
Unreinf conc, 10"	sy	31,613	3.81	3.65
13"	sy	347	4.40	4.63

Bids: 10-23-56 Items	Unit	Quantity	Unit 1C	Prices 2
Spec transition, slab	ls	1	350.00	1,000
Integral curb, roadway, 6" variable height	lf	9,627	0.32	0.50
Pvmt, hot mix asph conc, 3", airfield serv road	sy	1,690	1.10	1.20
Taxiway striping	sf	2,437	0.04	0.04
Curb, conc, & 24" gutter roadway	lf	69	1.56	1.50
Subtotal			239,772	237,516
Lighting				
4-way underground airport duct	lf	255	5.25	5.60
Subtotal			1,339	1,428
Total Part C			313,696	309,533
Part D & E—Site Preparation, Grading and Finish				
Site preparation	ls	1	35,500	7,500
Excav, airfield	cy	73,839	0.41	0.50
Borrow	cy	230,621	1.00	0.60
Embankment, compacted rock, airfield	cy	228,000	0.55	0.40
Tillage	ac	24	7.50	7.50
Fertilizing	ac	24	30.00	35.00
Sprigging	ac	20	75.00	75.00
Spot Sodding	sy	16,711	0.09	0.09
Solid sodding	sy	9	3.00	3.00
Watering	Mgal	720	1.20	1.20
Retaining wall	ls	1	20,870	25,000
Subtotal			447,460	303,907
Drainage				
RCP std str 15"	lf	232	4.50	4.15
24"	lf	934	5.75	5.75
30"	lf	260	6.50	7.00
Inlet type A	ea	3	200.00	325.00
B	ea	1	400.00	500.00
Curb inlet, std, 5'	ea	3	225.00	200.00
Headwall, RC, 24"	ea	1	250.00	175.00
Inspect & bkfl, existing storm sewer pipe		300	4.50	4.65

Bids: 10-23-56 Items:	Unit	Quantity	Unit Prices 1	2C
Remov exist inlet	ea	4	50.00	77.50
Cap exist inlet	ea	1	45.00	31.50
Conn to exist storm sewer line	ea	2	35.00	30.00
to exist MH	ea	1	30.00	46.50
Lower exist MH or inlet	ea	1	25.00	51.50
Subtotal			11,750	12,298
Paving				
Gravel subbase	cy	10,208	2.17	2.55
Pvmt, unreinf conc, 10"	sy	42,223	3.81	3.65
Hot mix asph conc, surf crse, 165 -sy	sy	2,282	0.60	0.77
Runway striping	sf	440	0.04	0.04
Taxiway striping	sf	1,518	0.04	0.04
Runway numerals	sf	1,196	0.04	0.04
Obliterat runway & taxiway marking	sf	1,794	0.04	0.04
Curb, conc, & 24" gutter roadway	lf	1,860	1.56	1.50
Subtotal			187,490	184,889
Lighting				
Airport cable trench	lf	4,650	0.32	0.27
Duct, underground, 2-way	lf	235	3.15	3.90
Airport cable 1 C 8 use, RR 3kv, in trench	lf	5,320	0.20	0.37
in duct	lf	570	0.20	0.40
Medium intensity lights, runway	ea	13	95.24	133.00
taxiway	ea	27	95.24	142.00
Subtotal			7,216	9,931
Total Part D			653,915	511,026
Part E Paving				
Canopy for conc walkway	ls	1	42,000	50,000
Lighting				
Covered walkway, distribution, & lighting	ls	1	2,560	4,000
Total Part E			44,560	54,000

Work started: November '56. To be completed: December '57
Liquidated damages: $500.00 per day

Close Bids on Indianapolis Airport Run—and Taxiways

The $1,553,335 contract for a new rigid reinforced cement concrete runway and taxiway with storm sewers and drains is only 0.1% below the second low bid and 1.6% below the engineers' estimate. Clyde E. Williams & Associates, Inc. of Indianapolis are consulting engineers for Indianapolis Municipal Airport.

Contractor Gast Construction Co., Warsaw, Indiana, has to work parallel to the present runway without interfering with the air traffic.

The 7,300 x 150 ft runway is designed for instrument landing of heavier aircraft. To increase the rate of acceptance, the runway may parallel taxiway, 75 ft wide, are connected by four high-speed turn-off taxiways.

The runway will be paved with 12-in. and 10-in. reinforced concrete, priced $6.05 and $5.27 per sq yd, on a compacted aggregate and bituminous base course. Reinforced and plain 8-in. portland cement pavement, both for $4.50 per sq yd, will surface the taxiway. Specifications require a flexural strength of 700 lb per sq in. of class A concrete and a minimum cement content of 5.3 bags per cu yd.

Paving accounts for 79% of the contract price. Excavation takes 9%, storm sewers and drain pipe with manholes take 6% and electrical ducts, riprap, seeding and sodding 3%.

Additional items covered in the addendum are necessary for the installation of a new instrument landing system. They account for 3% of the contract. These items include 50,453 cu yd of unclassified and borrow excavation, 1,200 lin ft of 54-in. corrugated metal storm sewer, two catch basins with grates, riprap, electrical duct and sodding.

Prevailing wage rates are $1.85 for unskilled labor, $2.20 to $2.90 for concrete workers and $3.15 for reinforcing iron workers.

Bidders include:

1C	Gast Const. Co., Waesaw, Ind	$1,553,335
2	Rieth-Riley Const. Co., Goshen, Ind	1,555,095
6	Wm. D. Vogel Const., Indianapolis, Ind. & McMahon Const. Co., Rochester, Ind	1,729,861
EE	Clyde E. Williams & Assoc, Engrs, Indianapolis, Ind	1,578,969

Bids: 8-2-56 Items	Unit	Quantity	Unit Prces 1C	2
Excav, uncl	cy	263,578	$0.52	$0.54
borrow	cy	3,459	0.52	0.90
Base crse, compact agg	cy	54,435	4.50	4.73
Bit matl for tack ct	gal	1,090	0.25	0.17
base crse	t	2,170	12.00	9.20
surf crse	t	650	12.00	9.20
matl for seal ct	gal	4,048	0.25	0.17
Cov agg for seal ct	t	55	3.00	2.60
Pav, plain pcc, 8"	sy	5,427	4.50	4.63
RPC, 8"	sy	27,222	4.50	4.57
10"	sy	55,740	5.27	5.13
12"	sy	82,926	6.05	5.86
CMP, bit coat storm sewer, type 1, 12 ga, 15"	lf	50	5.80	7.00
18"	lf	550	6.90	8.00
36"x22"	lf	2,880	11.65	12.00
29"x18"	lf	1,000	9.80	10.25
Drain, perf sub-surf, 6"	lf	17,350	1.50	1.50
non-perf, 6"	lf	1,200	1.42	1.40
Bkfl grad, porous, no. 1	cy	1,550	3.50	3.75
CB & MH 3.2', and less	ea	2	375.00	300.00
3.2' to 8.1'	ea	9	700.00	400.00
Remov MH & CB	ea	3	100.00	100.00
Lower & reset grates, MH & CB	ea	2	100.00	200.00
cap, MH & CB	ea	4	75.00	200.00
CB, spec, struct 106	ea	1	400.00	400.00

Continued on following page

Bids 8-2-56 Items	Unit	Quantity	Umit Prices 1 C	2
Elec duct, undergr, 4-way	lf	3,228	5.75	7.00
6-way	lf	576	7.50	9.00
Riprap, grtd, hand laid, 12"	sy	280	8.00	10.00
Seeding	ac	91.5	150.00	150.00
Sodding	sy	420	1.25	1.00
Pvmt, conc, rem	sy	16,560	0.80	0.60
Monuments, brass plug	ea	9	20.00	35.00
Addendum No. 1, total bid			50,417	59,635

Time to complete: 300 calendar days.
Liquidated damages: $100 per day.

Taxiways and Lighting at Miami International Airport

This $539,987 contract for improvement and enlargement of Miami International Airport for Dade County Port Authority went to Ronlee, Inc., Miami. Rader & Associates, Miami, are design engineers in association with Howard, Needles, Tammen & Bergendoff, New York, consulting engineers.

The contract price is 0.2% below the second low bid and 9.5% above the engineers' estimate. Taxiway grading and paving, reinforced concrete protection slabs and a 12-in. reflective striping, take 47% of the contract price while the remaining 43% goes for cables, underground ducts, trenches, marker lights and manholes.

Taxiways will be paved with 2-in. aggregate bituminous surface course at $7.65 per ton, placed on a 12-in. base course of lime rock at $4.31 per cu yd.

The lighting system requires 94,000 lin ft of 600-v to 15-kv cable, 6,000 lin ft of duct, 139 new marker lights and 6,100 lin ft of non-metallic conduit.

Class A concrete must agree to Civil Aeronautics Administration specifications D-752.

The six bidders on this CAA participation project include:

1C	Ronlee, Inc., Miami, Fla	$539,987
2	L. C. Morris	541,066
6	Central Fla. Const. Co., Riviera Beach, Fla	603,571
EE	Rader & Assocs Design Engrs: Howard, Needles, Tammen & Bergendoff, Consult Engrs, Miami, Fla	492,935

Bids: 10-2-56 Items	Unit	Quantity	Unit Prices 1C	2
Wind cone, relocate	ls	job	$1,188	$1,244
Trench, airport cable	lf	44,500	0.20	0.20
Cable, Undergr #6, 5 KV	lf	2,000	0.42	0.44
#8, 3 KV	lf	46,400	0.292	0.30
Equip-vault & tower, i	ls	job	2,968	3,110
Duct undergr-2 way 4"	lf	2,250	2.47	2.55
4 way 4"	lf	332	4.52	4.70
6 way 4"	lf	2,321	5.92	6.20
12 way 4"	lf	520	10.91	11.42
8 way 4"	lf	780	7.66	7.93
Conc backfill	cy	42	46.00	48.05
Marker lights new i	ea	139	133.08	139.00
modify and reinstall	ea	4	171.67	175.50
relocate	ea	34	121.80	127.50
H. I. lights, remove & store	ea	4	44.10	46.20
Grounding grid system	ls	job	8,391	8,790
Cable, 15 KV, #3, S/C	lf	3,900	1.765	1.84
4/0, S/C	lf	27,000	2.198	2.19
600V, #2, S/C,(TW)	lf	10,100	0.305	0.32
600V, #4, S/C,(TW)	lf	1,450	0.24	0.25
Cond, non-metal				
2-way, 4", type 1	lf	6,000	2.47	2.58
4-way 4", type 1	lf	100	4.515	4.73
MH, electrical type I	ea	7	2,500	2,620
type II	ea	25	1,643	1,721
type III	ea	1	1,659	1,790
existing, reinf	ea	2	1,041	1,090
Conc, class-A ditch bkfl	cy	55	46.00	48.05
Cable, 600V, #14 TW 37 conductor	lf	2,800	2.65	2.75

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Miami Airport

Continued from preceding page

Bids: 10-2-56 Items:	Unit	Quantity	Unit Prices 1C	 2
Control equip relocate	ls	job	951 30	996 00
Excavation, unclassif	cy	40,000	1 00	0 95
borrow	cy	500	1 30	1 50
Base crse, lime rock 12"	cy	30,000	4 31	4 10
Surf crse, agg-bit 2"	t	9,300	7 65	7 65
Bit matl	gal	147 600	0 13	0 13
prime coat	gal	23,500	0 20	0 20
Stormwater inlet	ea	1	375 00	350 00
Seepage trenches	lf	310	28 75	30 00
Conc for portect slab	cy	50	50 00	50 00
Steel for protect slab	lb	5,000	0 17	0 16
Planting sprigs	sy	134,200	0 06	0 07
Striping 12" wide, reflective	lf	20,400	0 10	0 085
Radio set, 2 way	set	1	413 00	455 00

Time to complete: 150 calendar days
Liquidated damages: $75.00 per day

Cement Concrete Pavement on North Dakota Airfield

To make room for 98,495 sq yd of rigid pavement and 2,845 sq yd of flexible pavement the contractor has to remove 79,300 sq yd of existing pavement at Hector Field in Fargo, North Dakota. The $849,624 job covers paving of run- and taxiways, aprons and a washrack at this Air National Guard Field. The Omaha District of the Corps of Engineers awarded contract to McCormick-Erling Company, Fargo, at a price, 1.4% below the second low bid and 4.4% below the engineers' estimate.

The rigid pavement is 10-in. portland cement concrete placed on a 6-in. base course on 1,000 ft of the runway and 9-in. on a 5-in. base on 3,495 ft. The taxiway will be surfaced with 10-in. rigid pavement on a 6-in. base and the aprons with 11-in. rigid pavement on a 7-in. base course. Transition sections between the new rigid and the existing flexible pavement on the runway have 3-in. flexible pavement on a 6-in. 80 CBR base course over 13 in. of 25 CBR subbase material. Granular filter courses under rigid and flexible pavement are 4 in. thick.

Work also includes subdrain systems with manholes and a complete lighting system. The Corps of Engineers supplies certain electrical items.

Concrete pavement priced $12.62 per cu yd accounts for 36.9% of the contract price, portland cement for this pavement, at $6.15 per bbl, for 26.7% and the drain systems for 7.9%. Excavation, filter and base courses, bituminous material, prime and tack coat, lighting, topsoiling and seeding account for the remaining 28.5%.

Concrete must have a flexural strength of 570 lb per sq in. at 14 days of age.

Minimum wage rates to be paid under this contract are $1.70 to $2.00 per hour for unskilled laborers, $2.30 for graders, finishing machine and spreader operators, $2.30 to $2.50 for mixers and $2.70 for electricians.

The five bidders include

1C	McCormick-Erling Co., Fargo, North Dakota	$849,624
2	S. J. Groves & Sons Co., Minneapolis, Minn.	861,737
5	Peter Kiewit Sons' Co., Billings, Montana	890,917
EE	Corps of Engineers, Ohaha District	888,703

Bids: 9-21-56 Items	Unit	Quantity	Unit 1 C	Prices 2
Runway, Taxiway and Parking Apron				
Site preparation	ls	job	$300	$30,000
Pavement removal	sy	79,300	0 43	0 65
Excavation	cy	25,150	0 55	0 60
Storm drain extens, 30"	lf	460	14 00	6 00
36"	lf	175	19 00	12 00
Flared end sect, remov & reinstall	ls	job	100 00	2,500
Subdrains, perf pipe	lf	11,430	3 80	3 00
outlet lines	lf	420	2 40	3 00
MH, type A w/new frame & cover	ea	12	480 00	1,000
w/salv frame & cover	ea	4	440 00	1,000
type B	ea	2	660 00	900 00
type C	ea	1	900 00	900 00
exist, adjust to new pvmt grade	ea	4	100 00	50 00
flushing & observ riser	ea	18	50 00	50 00
Filter crse, granular, 4", rigid & flex pvmt	sy	99,300	0 57	0 75
Base crse, rigid pvmt, 6"	sy	21,930	0 78	0 75
5"	sy	61,200	0 65	0 70
7"	sy	13,320	0 91	0 80
Concrete pavement	cy	24,275	12 62	11 50
Cement for conc pav	bbl	36,425	6 15	5 00
Tie-down anchors	ea	135	6 50	4 00
Base course matl for rigid pvmt	cy	2,550	5 00	4 00
Subbase crse, 25 CBR, flex pvmt	sy	2,845	2 00	0 60
Base crse, 80 CBR, flex pvmt	sy	2,845	1 20	1 45
Bit prime coat	gal	940	0 30	0 15
tack coat	gal	430	0 30	0 15
Binder crse	t	240	16 20	12 00
Surf crse	t	240	16 20	12 00
Bit matls	gal	5,700	0 30	0 16
Marking & striping	ls	job	4,500	4,000
Topsoiling	ls	job	2,500	7,500
Seeding, permanent	ls	job	2,700	7,000
temporary	ls	job	360	2,500
Temp protection	ls	job	900	3,000
Watering	Mgal	10	4 00	4 00
Airfield lighting, compl	ls	job	13,500	17,000
Washrack and POL Apron				
Excavation	cy	660	0 65	1 00
Washrack drain line	lf	432	4 30	6 00
Drain inlet	ea	1	400 00	250 00
Water service line	ls	job	1,400	4,500
Subdrain perf pipe	lf	340	3 80	2 50
manhole, type A	ea	1	480 00	750 00
flushing & observ risers	ea	3	50 00	50 00
Tie-down anchors	ea	18	6 50	4 00
Conc pav	cy	610	12 62	11 50
Cement for conc pav	bbl	915	6 15	5 00
Base crse, 7", rigid pvmt	sy	2,045	0 91	0 80
Filter crse, gran, 4", rigid & flex pvmt	sy	2,045	0 57	0 75
Topsoiling	ls	job	360	1,800
Seeding, permanent	ls	job	50	2,500
temporary	ls	job	15	1,800
Temporary protection	ls	job	30	1,500
Watering	Mgal	3	4 00	4 00

Time to complete: 335 calendar days

Chicago Midway Airport Improves Runways, Taxiways

Bituminous concrete paving cement, concrete patching and markings on runways and taxiways at various locations of Chicago Midway Airport will cost the City of Chicago $372,574. This contract to George H. Hartong, La Grange Park, Illinois, beats the second low bid by 4.25% and the high eleventh bid by 39%.

The bituminous wearing surfaces consist of a priming coat of medium cure asphalt to be spread from 0.2 to 0.4 gallons per sq yd. The leveling course will support 2-in. binder and surface courses on runways and 1½-in. binder and surface courses on taxiways.

Specifications require on gradation A an asphalt-cement percentage of 3% to 5% for the bituminous aggregate in leveling and binder courses. On gradation B, the asphalt-cement percentage is 4% to 5% for surface courses. The priming coat must confirm to AASHO specifications M-82. No slag aggregates are permitted.

Class B concrete for patching must contain fine and coarse aggregate and portland cement and must be reinforced where required.

Three 12-in. longitudinal stripes will mark each runway and taxiway and two 12-in. stripes perpendicular to the centerline will mark runway thresholds. Yellow and white reflective paint conforming to U. S. Corps of Engineers specifications T-1290-A type 1 class B will be applied by power driven mobile paint sprayers.

The contractor was low on all bituminous paving work which drew prices between $7.00 and $12.50. Painting prices range from $0.05 to $0.15 per sq ft. Special excavation runs from $4.50 to $30.00 per cu yd. One bidder priced the adjustment of manholes and basins at $0.50 per unit which compares to a range from $40.00 to $70.00 bid by the other bidders.

Minimum wage rates scheduled for this project include $2.05 to $2.80 for truck drivers, $2.575 to $2.85 for asphalt workers, $2.575 for laborers, $2.575 to $2.80 for cement gun nozzle work, $3.25 for cement masons, $3.275 for painters, $3.075 to $3.45 for equipment operators and $3.55 for reinforcing iron workers.

The eleven bidders include:

1	George H. Hartong, La Grange Park, Ill.	$372,574
2	Rock Road Const Co., Chicago, Ill.	389,170
11	Reedy Paving & Constr Co., Chicago, Ill	610,291

Bids: 10-23-56 Items	Unit	Quantity	Unit Prices 1 C	 2
Excavation, special	cy	668	$6 00	$5 00
MH & basins adjust	ea	3	50 00	0 50
MH, new frames & lids	ea	3	300 00	220 00
Patching, new conc	cy	668	25 00	18 00
Leveling crse, runways & taxiways	t	5,515	7 50	7 65
Binder crse runways 2"	t	8,232	7 00	7 65
taxiways 1½"	t	4,748	7 00	7 65
Surf crse runways 2"	t	21,324	7 50	7 95
taxiways 1½"		4,748	7 50	7 95
Painting & reflec	sf	57,175	05	06
Edge stop on runways 4'	t	993	7 50	7 95
on taxiways 3'	t	319	7 50	7 95
Overlap of surf crse-runways 22R/13L 75'	t	833	7 50	7 95
Prime coat	gal	20,535	0 20	0 19

To be completed: 11-15-56

Airport Contracts Exceed $600 Million for 11 Months

Contract awards for airports and airport facilities, reported to ENGINEERING NEWS-RECORD and CONSTRUCTION DAILY, total $623.3 million for the first 11 months of this year.

The impact of the nation's defense program on the airport construction figures is readily apparent. Of the $623.3 million in contracts awarded through November, federal projects accounted for $526.4 million.

State and municipal airport contracts totaled $94.1 million during the same period. Private airport work continued to represent only a small part of the total.

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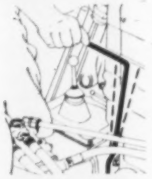
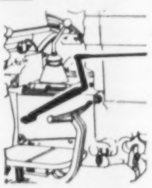


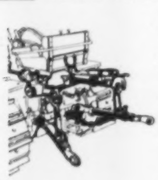
Lets you move forward or backward in the same speed—no time wasted shifting gears. Detail shows lever in neutral position, dotted lines reverse and forward travel positions. Available as optional equipment on "420" Crawler and Utility models.

2 *Time-Saving* FOOT THROTTLE



Increases engine speed and ground-travel speed approximately 25 per cent—makes possible speeds up to 17 mph on the highway. Helpful when maneuvering in close quarters. Inexpensive. Easy to attach. Optional for "420" Crawler and Utility models.

3 *Heavy-Duty* 3-POINT HITCH



Gives you "pick up and go" operation with the John Deere Crawler tractor. Change tools in minutes, raise and lower them hydraulically. Heavy-duty construction. Leveling adjustments made without leaving tractor seat. Optional for John Deere Crawlers.

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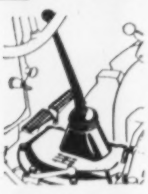

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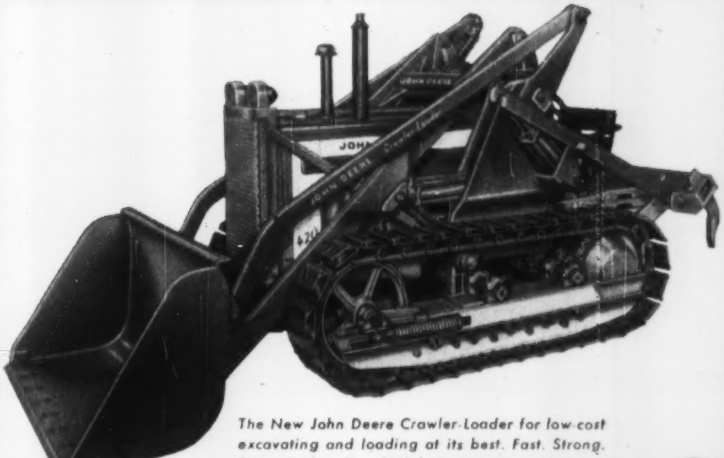

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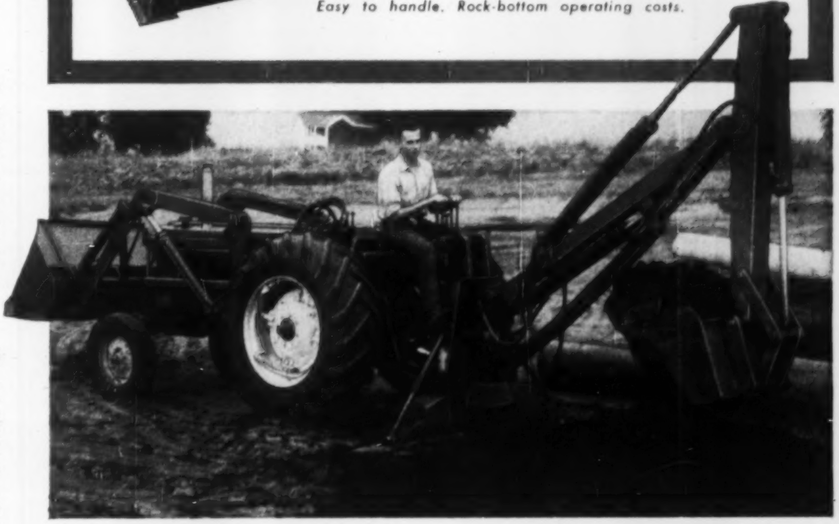

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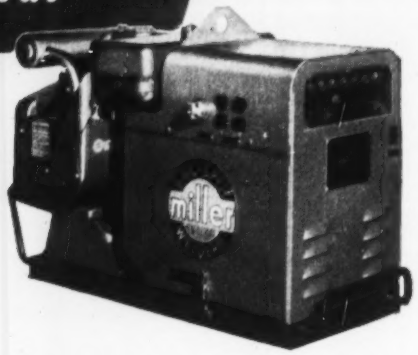

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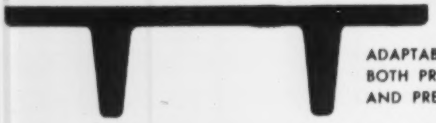

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Bridges

Steel Girder Underbids Post-Tensioned Concrete

The pedestrian crossing over the Delaware River to replace the old covered bridge between Portland, Pa. and Columbia, N. J. will be a 4-span, continuous half-through girder bridge, 770 ft long and 8 ft wide. It will cost $319,762.

This is 13% under the low bid for the alternate design—four simple spans of post-tensioned concrete of the same length and width. The steel design is by Edwin W. Denzler, Jr., chief engineer, Delaware River Joint Toll Bridge Commission to replace the wooden covered bridge washed out in the August, 1955 flood.

The concrete structure was designed by J. E. Greiner Co., Baltimore, consulting engineer.

Class A concrete for the steel bridge must develop 3,000 psi. Class S concrete for the concrete design had to test at 6,000 psi.

The Lenry, Inc.-Bergan, Inc., New York, steel design contract is 6% over the engineer's estimate but 5% under the second low and almost 38% under the high of five bidders.

These include:

Steel Girder Pedestrian Bridge

1C	Lenry, Inc.-Bergan, Inc. 122 E. 42nd St., NY 17, NY	$319,762
2	Condui ! & Foundation Co. 158 S. 20th St., Philadelphia, Pa	337,612
5	Brookfield Construct on Co., 521 Fifth Ave., NY	510,568
EE	Edwin W. Denzler, Jr. Chief Engnr, Delaware River, Joint Toll Bridge Commission	302,000

Bids: 10-24-56 Items	Unit	Quantity	Unit Prices 1 C	 2
Remove existing bridge	ls	job	$20,162	$9,000
parts of piers	cy	260	74.00	50.00
Piers, stone, relaying	cy	70	150.00	120.00
Structures, conc, cl A	cy	375	120.00	110.00
Conc sidewalk 4"	sy	8	5.00	9.00
6"	sy	24	6.00	10.00
Conc, cl A-5" floor	cy	115	80.00	110.00
Steel reinforcing	lb	27,000	0.20	0.17
Bridge shoes	lb	10,000	0.40	0.70
Steel, structural	lb	574,000	0.33	0.38
Pipe railings, welded	lf	1,546	6.00	10.00
Approach pipe railing	lf	12	15.00	30.00
Pave & masry remove	cy	35	40.00	35.00
Borrow	cy	85	3.00	3.00
Top soil & seeding	sy	130	1.50	2.00
Repointing joints	lf	2,100	0.50	0.30
Field office	ls	job	4,000	5,000
New pavement wash	ls	job	300.00	100.00

Time to complete: 700 calendar days
Liquidated damages: $250.00 per calendar day

Alternate—Post-Tensioned Concrete

1	Lenry Inc.-Bergan, Inc., 122 N. 42nd St., New York, 17, NY	$367,862
2	Brann & Stuart, Whitehead Road, Trenton, N. J.	372,154
4	Brookfield Construction Co., 521 Fifth Ave., New York, N. Y.	527,125
EE	J. E. Greiner Co., Baltimore, Md	340,000

Bids: 10-24-56 Items	Unit	Quantity	Unit Prices 1 C	 2
Remov.	ls	job	$20,162	$7,230
parts of piers	cy	260	74.00	30.00
Relaying stone, piers	cy	70	150.00	50.00
Conc. Class S	cy	470	240.00	406.00
A structures	cy	430	120.00	76.10
A sidewalks	sy	40	6.00	10.00
Steel, Reinforcing	lb	66,000	0.20	0.20
Galvanized strand	lb	55,500	0.70	0.60
End anchorage castings	lb	96,000	0.60	0.35
Cable saddles	lb	6,500	0.40	0.60
Bridge shoes	lb	16,500	0.40	0.50
Conc filled grid slab	sf	150	10.00	13.00
Steel struct br railing	lf	1,560	15.00	18.00
Approach pipe railing	lf	85	15.00	12.00
Remov pave & masonry	cy	60	40.00	25.00
Excavation structure	cy	85	2.00	7.00
Borrow	cy	85	3.00	6.00
Topsoil & sodding	sy	80	1.50	2.20
Field office	ls	job	4,000	2,300
Repointing jts in masonry	lf	2,100	0.50	0.60
New pavement wash	ls	job	300.00	40.00

Forest Highway Bridges in Washington State

Two bridges, both reinforced concrete girders, on Randle-Yakima Highway in Gifford Pinchot National Forest, Lewis County, Washington, drew eight bids. The $91,570 contract to Gro-Bar Engineering Co. of Yakima, Washington, is 2.2% under the second low and 23.2% below the high bid.

The three-span Silver Creek Bridge is 170 ft long and the single-span over Davis Creek is 85 ft long, both are 36 feet wide. This is a Washington Forest Highway Project of the Bureau of Public Roads, Portland, Oregon. F. E. Andrews is division engineer of the BPR.

Unit prices ranged from $5 to $20 per cu yd for excavation, from $78 to $110 per cu yd for class A concrete, from $0.137 to $0.16 per lb for reinforcing steel and from $8 to $15 per lin ft of metal hand rail.

Specifications call for 6½ sacks of cement per cu yd of concrete.

The eight bidders include:

1C	Gro-Bar Engineering Co., Yakima, Wash	$91,570
2	C. J. Eldon, Contr., Portland, Ore	93,649
8	Peter Kiewit Sons' Co., Vancouver, Wash	119,270

Bids: 9-21-56 Items	Unit	Quantity	Unit Prices 1 C	 2
Excav, uncl, for struct	cy	565	$7.00	$10.00
Concrete, cl A	cy	783	80.00	78.00
Steel, reinforcing	lb	154,500	0.137	0.145
Metal hand rail	lf	476	8.00	9.50

Time to complete: 180 calendar days
Liquidated damages: $25 per day.

Continuous Concrete Slab Bridge in Wyoming

Seven continuous reinforced concrete slab spans will carry Wheatland-Cheyenne road over Lodge Pool Creek in Laramie County, Wyoming. This is the first structure to be built for the Wyoming State Highway Commission in Cheyenne under the new interstate program in accordance with the Federal Aid Act of 1956. A. L. Petnam Cheyenne, is consultant.

Riedesel-Lowe Company's contract price $60,212, is 3.95% below the second low bid and 11.7% below the engineer's estimate.

Spans: one 22-ft-4½-in., five 27-ft-0 in., one 22-ft-4½-in. Height is 29 ft from stream bed to finish grade.

Class A concrete takes 58% of the contract price, reinforcing steel, 30.5%, structural steel 5.7%, excavation, tamping and haul, the remaining 5.8%.

Class A concrete must test at 4,000 lb per sq in. Bids range from $61.50 to $85.00 per cu yd. Reinforcing steel prices range from $0.14 to $0.17 per lb and structural steel in place drew prices of $0.30 to $0.45 per lb.

Minimum wage rates are $1.65 to $2.30 for laborers and truck drivers, $2.25 to $2.60 for concrete mixers, $2.25 to $2.90 for power equipment operators and $2.00 to $3.00 for ironworkers.

The six bidders include:

1C	Riedesel-Lowe Co., Cheyenne, Wyo	$60,212
2	Husman Bros. Inc., Sheridan, Wyo	62,689
6	Knisely-Moore Co., Douglas, Wyo	77,234
EE	A. L. Putnam, Cheyenne, Wyo	68,204

Bids: 9-27-56 Items:	Unit	Quantity	Unit Prices 1 C	 2
Excavation	cy	400	$1.00	$0.50
Haul	cymi	40	1.00	0.50
Mechanical tamping	hr	10	10.00	12.00
Excav for bridges, dry	cy	30	6.00	4.00
wet	cy	460	6.00	4.00
Class A conc	cy	563.1	62.00	61.50
Structural Steel	lb	11,470	0.30	0.30
Reinforcing steel	lb	131,280	0.14	0.17

Time to Complete: 120 working days
Liqu dated damages: $50.00 per day

Florida Bascule Bridge for $36.82 per sq ft of Deck

Precast prestressed concrete beams and piles are specified for the 335.5-ft Juno Beach Crossing of an intra coastal waterway in Palm Beach County, Florida. This $432,380 bascule bridge for the State Road Department of Florida in Tallahassee will be built by Cleary Brothers Construction Company, Palm Beach. They underbid the second low bid by 9.14% and the engineer's estimate by 9.17%. H. E. Lewis is state highway engineer and W. E. Dean is assistant state highway engineer.

Four 40-ft fixed spans and one double-leaf bascule span of 136 ft with two 19.75-ft bascule piers carry a 29-ft two-lane roadway and two 3.5-ft sidewalks. The electrically operated bascule span has simple cement concrete trunnions supported by pit type piers on concrete foundations. Its roadway floor and sidewalks are steel. The fixed approach spans are four precast prestressed concrete beams on pile bents, each of four 18-in. prestressed concrete piles, with concrete deck. Navigation fenders are treated timber.

Prestressed concrete piles drew bids ranging from $8 to $10 per lin ft, prestressed unloaded test piles ranged from $25 to $35 per lin ft. Bids on class A concrete ranged from $60 to $85 per cu yd in approach spans, from $46 to $72 in bascule piers and from $42 to

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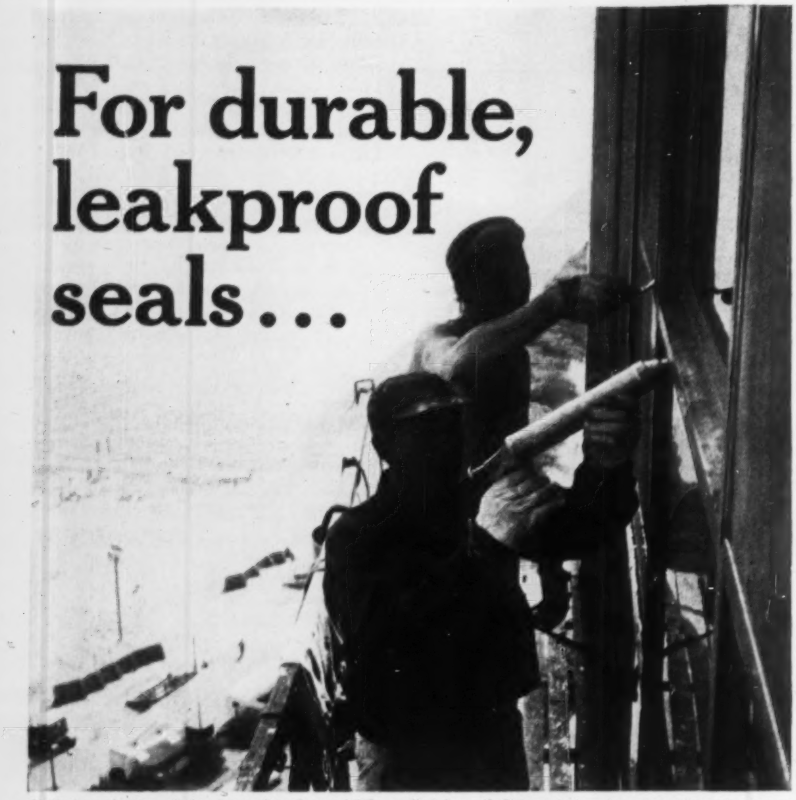

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(Thiokol Chemical Corporation manufactures THIOKOL Liquid Polymer as a raw material. "Lasto-Meric" is manufactured by the Tremco Manufacturing Co., Cleveland, Ohio.)

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Florida Bascule Bridge

Continued from preceding page

$60 in the counterweight. Reinforcing steel drew bids from $0.13 to $0.15 per lb. Lump sum bids on approximately 281,000 lb of structural steel ranged from $90,000 to $104,000. On 60,000 lb of machinery and castings the bid range was $50,000 to $69,000.

Specifications call for class P concrete in prestressed members. It must contain 1.625 bbl of type I cement per cu yd and test at a compression of 5,000 lb per sq in. after 28 days. Class A concrete with 1.5 bbl of type I cement per cu yd and a compression of 3,500 lb per sq in. in 28 days will be used for all non-prestressed parts.

Wage rates are $1.00 for common labor, $1.50 to $2.00 for semi-skilled and $2.00 to $2.50 for skilled labor.

Highways

Competitive Illinois Tollway Job Awarded for $2.7 million

Ryan Construction Co., Inc. of Evansville, Indiana, was successful October 4, against 16 other bidders on this 5.49-mile stretch of four-lane Illinois Tollway with structures. Running northwest from the McHenry-Kane County line south of Harmony, this $2,728,964 contract is the second of 51 roadway contracts for the 193-mile $415 million North Illinois Tollway. It is 2.5% above the second low and 26.9% above the high bid. George L. Jackson is chief engineer of the Illinois State Toll Highway Commission in Chicago. Casler & Stapleton and Brown & Blauvelt, Huntley, Ill., are section engineers and Joseph K. Knoerle & Associates, Inc., Chicago, is the consulting engineer.

The contract calls for grading, drainage, paving, construction of appurtenances and the erection of three precast prestressed concrete bridges to carry roadways over the tollway. Twin structures will take the tollway over streams at three locations.

Eastbound and westbound roadways will each be 25-ft wide and will be separated by a 50-ft wide sloped median strip. The 10-in. reinforced concrete pavement will be placed on a 4-in. granular subbase and on 10-in. selected subgrade material. Outside shoulders of 3-in. bituminous concrete are 11 ft wide to allow parking of automobiles and trucks clear of the pavement. The inside shoulders, are 5 ft wide. Thus, with shoulders, a total roadway of 41 ft is provided in each direction.

Quantities of material involved in the

Bidders include:

1C	Cleary Bros. Constr. Co., W. Palm Beach, Fla	$432,380
2	Industrial Constr. Co., Ft. Laudersale, Fla	475,842
4	The Murphy Constr. Co., W. Palm Beach, Fla	528,401
EE	State Road Department, Tallahassee, Fla	476,000

Bids: 9-20-56 Items	Unit	Quantity	Unit Prices 1C	Unit Prices 2
Timber, struct, treat 12 lb treatment	Mfbm	15.72	$400.00	$440.00
Conc, cl A, appr spans	cy	237.5	65.00	85.00
bascule piers	cy	1,218.5	52.00	46.00
counterweight	cy	210	55.00	42.00
Conc seal	cy	740.6	56.00	57.50
handrail	lf	443	5.50	12.00
Steel, reinforcing	lb	136,710	0.13	0.15
struct, approx 281,000	ls	job	90,000	98,000
Machinery & castings, approx 60,000	ls	job	50,000	69,000
Piles, treated timber	lf	6,020	2.50	3.25
prect prestr, 18" sq, conc	lf	3,600	8.00	9.00
unloaded test, prestr, 18" sq	lf	90	25.00	30.00
Test load, 96 tons	ea	1	100.00	200.00
Steel rdway flr, 5" dp	sf	3,163	5.75	5.50
armored, 3" dp	sf	825	5.50	4.90
sidewalk floor	sf	757	5.00	4.00
Control house	ls	1	5,500	6,650
Elec equipment	ls	1	48,000	54,000
Beams, prestr, type C	lf	628	12.50	13.50

Time to complete: 400 working days.
Liquidated damages: $80 per day.

and Roadwork

work include 350,000 cu yd of roadway excavation which drew bids running from $0.42 to $0.65 per cu yd, 650,000 cu yd of borrow with bids ranging from $0.55 to $0.90 per cu yd, 106,000 cu yd of selected subgrade, $0.95 to $4.15 per cu yd; 160,000 sq yd of 10-in. reinforcing portland cement concrete pavement, $5.35 to $6.30 per sq yd, and 103,000 sq yd of 3-in. of bituminous concrete shoulders, $1.24 to $1.50 per sq yd. Contract prices for 2,600 cu yd of structure concrete ranged from $35.00 per cu yd in footings to $80.00 per cu yd in box culverts.

The contractor will furnish all material except precast concrete beams and deck plank.

Specifications for concrete pavement call for a 2-in. maximum size of aggregate, a cement content of 5½ sacks per cu yd, a maximum water cement ratio of 5½ gallons per sack of cement, a maximum slump of 1½ in. machine finish and 3 in. hand finish, 4½% plus/minus 1% entrained air, and a compression of 4,000 lb per sq in at 28 days.

Concrete for structures shall conform to the following requirements:

	Classes of Concrete K	Classes of Concrete M	Classes of Concrete R
Max. size aggregate	2 in.	1 in.	1 in.
Min. cement content, sacks per cu yd	5	5¼	6¾
Water cement ratio, gal per sack	5¾	5½	5
Maximum slump	3 in.	3 in.	3 in.
Entrained air, per volume of concrete	4±1%	4±1%	3±1%
Compressive strength at 28 days, psi	3,000	3,000	5,000

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CUTTING WEEKS OFF SHORING SCHEDULES

DECEMBER 1956
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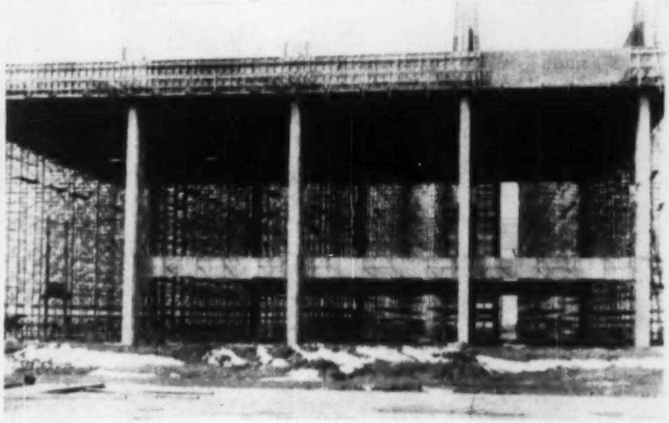
DECEMBER 1956



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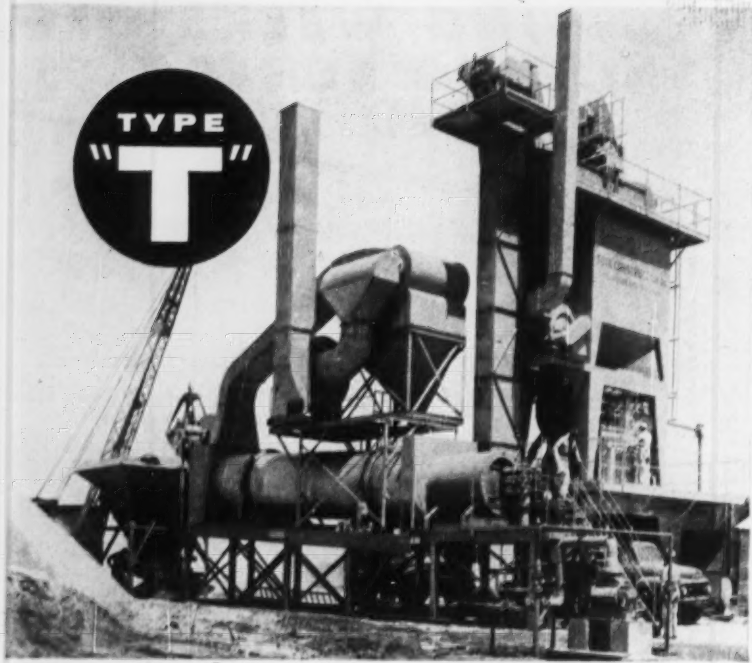

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Illinois Tollway

Continued from preceding page

Prevailing wage rates are $2.35 to $2.90 for truck drivers, $2.40 to $2.65 for laborers, $3.05 and $3.15 for pavers and mixers, $3.20 for power shovel operators, $3.25 for iron workers, $3.45 for cement masons and $3.59 for pipe fitters.

The 17 bidders on the second roadway contract include:

1C	Ryan Construction Co., Evansville Ind	$2,728,964
2	The Standard Paving Co., Chicago and Peter J. Crowley Co., Maywood, Ill	2,798,328
17	Johnston Roadbuilders, Inc., Joliet, Ill	3,731,738

Bids: 10-4-56 Items	Unit	Quantity	Unit Prices 1C	 2
Roadway				
Clearing & grubbing	ls	job	$4,345	$30,000
Excav, uncl, roadway	cy	343,000	0.48	0.42
Excav, special	cy	121,000	0.39	0.42
Borrow	cy	650,000	0.55	0.70
Top soil spreading	ac	90	495.00	500.00
Check borings	lf	550	4.60	3.00
Undisturbed samples	ea	22	6.00	15.00
Seeding	ac	115	58.75	130.00
Lime	t	230	8.65	8.50
Fertilizer	t	5	470.00	575.00
Mulch covering	ac	115	195.00	185.00
Sodding	sy	7,000	0.90	0.75
Watering, supplemental	Mgl	55	5.55	7.50
Special fill	cy	500	4.50	2.00
Drainage				
Excavation, channel	cy	1,700	0.80	1.25
Culv, CMP, bit ct 16-ga, 12"	lf	60	5.95	3.75
CMP or RCP 16-ga, 12"	lf	1,800	5.95	3.75
CMP, bit ct 16-ga, 15"	lf	1,500	7.00	4.50
CMP or RCP 16-ga, 15"	lf	4,400	6.70	4.50
14-ga, 24"	lf	80	9.90	7.50
30"	lf	90	11.55	9.25
12-ga, 36"	lf	350	16.00	13.75
42"	lf	160	18.45	16.00
10-ga, 60"	lf	150	31.20	29.00
Arch, CMP, bit ct				
16-ga, 18"x11"	lf	150	7.25	4.75
14-ga, 36"x22"	lf	160	12.65	9.50
Culv, RCP, extr str, 30"	lf	270	14.80	13.00
42"	lf	120	26.20	25.00
Conc for headwalls, cl M	cy	130	104.55	90.00
Reinforcing steel	lb	8,000	0.14	0.15
RCP, storm sewer, 15"	lf	50	6.80	4.75
Tile drain-agricultural, 8"	lf	800	2.10	2.00
line junction box	ea	1	108.15	125.00
MH, type 1	ea	2	391.00	500.00
Inlets, type D-2	ea	68	168.00	200.00
D-2 special	ea	2	267.00	220.00
Misc structures, cl M conc	cy	6	135.00	100.00
Inlets T2 for TB gutter	ea	2	144.00	225.00
dbl	ea	1	175.00	300.00
Conc, gutter, type B	lf	870	2.46	2.25
Ditch paving	sy	640	6.65	6.00
Inlets type D-2 modified	ea	1	267.00	220.00
Riprap, dumped 12" depth	sy	420	5.45	2.50
Inlets, type D-5	ea	8	85.00	200.00
Drain pipe, wrought iron, 6"	lf	40	45.00	18.00
CMP, bit ct, 16-ga, 8"	lf	900	3.35	3.00
Pavement				
Subgrade, selected	cy	105,700	1.20	1.10
Subbase, granular	cy	61,700	2.30	2.65
Base crse, grav or cr stone	cy	1,700	4.55	4.00
Pavement, reinf, PCC 10"	sy	160,000	5.75	5.35
9"	sy	5,200	5.85	5.75
12"	sy	900	14.50	17.00
Surf crse, grav or cr stone,				
TA	t	4,300	3.30	2.00
TB	t	150	3.30	2.00
Bit. matls, prime coat	gal	3,200	0.25	0.25
cover coat	gal	2,300	0.25	0.25
Cover coat aggregate	t	120	8.25	7.50
Bit conc shoulders 3"	sy	102,500	1.35	1.40
binder	t	300	8.25	12.00
wearing crse	t	300	8.25	12.00
Grav or cr shoulders	cy	60	6.65	2.50
Roadway Appurtenances				
Guard rail, stl plate beam,				
10-ga	lf	1,500	3.50	3.40
12-ga	lf	11,200	3.70	3.20
Settlement platform	ea	6	41.35	125.00
Right of way markers	ea	115	7.15	8.25
Monuments	ea	26	49.50	30.00
Permanent barricade	lf	130	15.00	10.00
Temp fence elec wire	lf	14,400	0.22	0.24
barbed wire	lf	11,600	0.22	0.35
farm field	lf	11,900	0.25	0.61
Right of way, fence, T2	lf	59,900	0.72	0.84
Miscellaneous				
Field Office	ea	1	15,000	10,000
Field laboratory	ea	1	3,500	5,000
Maint. of hwy traffic	ls	job	26,000	20,000

Continued on following page

No hydraulics to break, leak or freeze-up!

No small front steer-wheels to align!

No tie-rods to bend!

No springs to break!

No frame to warp!

No long drive-shaft to maintain!

Cuts your hauling costs!

Tournapull Rear-Dump overcomes most maintenance problems of conventional haulers

Construction of Tournapull Rear-Dump is radically different (and much simpler) than that of a conventional heavy-duty hauler. In place of a foundation frame and body sub-frame, Tournapull Rear-Dump hitches rear and front wheels through a horizontal yoke extending back from the kingpin, and pivoted to body itself just above and ahead of rear wheels. Body is simpler, much stronger . . . has no frame and sub-frame to get out of line.

Look at the photo above . . . note the absence of springs, spring hangers, and tie rods. Low-pressure tires adequately absorb the shocks of rough haul-road travel and shovel loading. Eliminated are spring maintenance, replacement time, and cost of spring parts.

Front-wheel drive and kingpin-type power steer helps simplify Tournapull construction, too. No longer must power be carried back to the rear through a drive-shaft. Bearing and lubricating problems of a long drive-shaft are eliminated. No longer is steering handled by small front wheels subject to "bulldozing" and misalignment. There are no tie rods, no hinged steering connections to become twisted or bent.

Nor do you have the troubles of hydraulic hoists or gravity dumping with these Rear-Dumps. Dump is by an electric winch, that lifts the body up on twin cables. Operation is under complete control at all times — with positive power for dump and return controlled by an electric switch on the dash. There are no oil seals, hydraulic pumps . . . no high-pressure lines and jacks to keep tight . . . no freezing up in cold weather as with hydraulics. There are no shock loads as in gravity dumping. You save on regular maintenance time because there is no hoist mechanism to check . . . only a few places to inspect and lubricate.

Let us show you how these savings can put money in *your* pocket. For proof, we'll be glad to show you performance figures from a job like yours. Or, if you wish, we'll give you names and addresses of nearby owners of Tournapull Rear-Dumps, so you can check the facts for yourself.

Model D — 11 tons, 138 hp

Model C — 22 tons, 208 hp

Model B — 35 tons, 293 hp

Now available with optional tailgate. Prime-mover also powers interchangeable scraper, bottom-dump, flat-bed, crane, logging arch.

Tournapull—Trademark Reg. U.S. Pat. Off. R-1171-G-b

LeTourneau-WESTINGHOUSE Company, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

ARBA See you at the ROAD SHOW • Chicago • January 28-February 2, 1957

Illinois Tollway

Continued from preceding page

Bids: 10-2-56 Items	Unit	Quantity	Unit Prices 1C	Unit Prices 2
Structures				
Excav, common structure	cy	900	10.60	1.50
Conc, cl K, in footings	cy	330	35.00	40.00
above footings	cy	310	50.00	60.00
cl M, for box culvs	cy	180	80.00	60.00
in structures	cy	1,700	65.00	65.00
Struct stl miscellaneous	lb	31,000	0.43	0.35
Scuppers	ea	62	115.00	200.00
Drain pipe, wrought iron, 4"	lf	460	14.00	12.00
Reinf steel	lb	352,800	0.13	0.13
Pile shells, metal, f	lf	4,840	3.80	4.25
drive & fill	lf	4,840	1.60	2.00
Piles, steel, f	lf	1,470	5.05	4.25
drive	lf	1,470	1.20	1.25
Test piles	lf	180	320.00	600.00
Pile test loading	ea	1	1,000	1,500
Piles, cylinder, prestr conc furnish	lf	1,820	33.60	30.00
erect	lf	1,820	12.45	25.00
Beams, prestr conc, 48", erect	lf	5,000	2.05	2.50
Deck plank, prestr conc, erect	sf	22,300	0.23	0.40
Conc slope protection	sy	1,100	7.95	12.00
Aluminum pipe handrail, TB	lf	2,370	4.60	5.00
Corrugated mtl sec plate arch, bit coated, 12 ga, 9'0"x4'3-1/2"	lf	310	25.85	32.00

Time to complete: 400 calendar days
Liquidated damages: $1,100 per day

Ohio Highway and Bridge Bids Compared With Estimate

Successful unit price bids on grading, drainage, reinforced concrete pavement, a bridge and waterwork for the 1.68-mile Snow Road in Cuyahoga County, Ohio, are compared here with estimated costs available from Albert S. Porter, Cuyahoga County Engineer. The new project is in the city of Parma and in the village of Seven Hills.

The $894,149 low bid from the Horvitz Company of Cleveland, Ohio, took the contract at a price 11.75% below the engineer's estimate and 9.25% below the only other bid that was submitted.

The contractor has to complete work within one month. This includes: 45,000 sq yd of 9-in. reinforced concrete pavement on a 3-in. insulation course, placed on 8,880 lin ft of roadway. Of this total length, part of a 5,750-lin ft section is 52 ft and part is 28 ft wide, while the remaining 3,120 lin ft section is all 28 ft wide.

Excavation for the roadway includes the removal of existing flexible pavement. Excavating will be complicated by soft to hard sandstone very close to the surface. The removal-and-disposal of existing pavement at full depth, also curb, sidewalk, pavement and cushions is priced separately.

Drainage includes 6-in. to 27-in. vitrified clay or reinforced concrete pipe and some vitrified clay or plain concrete pipe.

The reinforced concrete and structural steel span across West Creek will cost $186,000. Concrete abutments, piers and columns support wide-flange 33-in. steel beams. Concrete approach slabs are 10 in. thick and the concrete sidewalks 6-in. The Method B asphaltic concrete surface consists of a 1½-in. binder course, Type T-50-08 along with a 1-in. R-50.09 wearing course.

The contractor's unit price bids are generally identical with the estimated costs. But his low bids on excavation, removal and disposal of concrete sidewalk, storm sewer pipe, steel beams, concrete in structures and on insulation course brought the total contract down below the estimate, although he was high on the miscellaneous painted steel item.

Specifications require 6.5 sacks of cement per cu yd of Class D concrete in pavement and per cu yd of Class C concrete in structures. Class E concrete in structures must contain 5.5 sacks of cement per cu yd.

Prevailing wage rates are $2.75 for unskilled labor, $2.95 for semi-skilled and 3.575 for skilled labor.

The two bidders are:

1C	The Horvitz Co., Cleveland, Ohio	$894,149
2	Lombardo Bros. Constr. Co., Cleveland, Ohio	985,310
EE	Albert S. Porter, Cuyahoga County Engr. Cleveland Ohio	1,013,100

Roadways

Riprap for tree protect	sy	100	$10.00	$10.00
Seed & protect roadway areas method #2	sy	55,000	0.15	0.20
Agricultural ground lime stone	t	25	30.00	40.00
Fertilizer commercial, (10-6-4) mix	t	5	80.00	110.00
Excav rdwy, incl existing flexible pvmt, uncl	cy	57,000	1.50	2.10
Sub-grade compacted	sy	27,200	0.05	0.08
Borrow	cy	15,000	1.50	2.00
Remove & dispose existing pvmt full depth	sy	2,200	2.50	2.50
stone curb	lf	850	0.30	0.30
conc header	lf	120	0.35	0.35
conc sidewalk	sf	13,300	0.05	0.10
asph conc surf	sy	300	0.70	1.00
brick & cushion	sy	100	1.30	1.30
conc pvmt drives	sy	50	1.50	1.50
Monument boxes SMB #36B, f&s	ea	17	50.00	50.00
Sidewalk, conc, 4½" w/gran slag or screenings bed 2"	sf	14,400	0.55	0.60
6" w/gran slag or screenings bed 2"	sf	425	0.70	0.70
Remove & dispose of existing guard rail	lf	485	1.00	1.00
Guard rail, stl beam type, deep	lf	3,400	3.00	3.00
deep barricade complete	lf	25	4.00	4.00

Drainage including Small Culverts

Storm sewer under pvmt VSP sec M-6.8 b or PCP sec M-6.5 b 6"	lf	350	3.50	4.00
VSP or RCP 12"	lf	200	5.00	7.15
15"	lf	200	7.70	9.70
18"	lf	200	7.80	9.80
Excav for structs, uncl	cy	650	7.50	10.00
for channel uncl	cy	100	5.00	7.00
Y pipe specials, 27"x6"	ea	5	105.00	105.00
24"x6"	ea	8	75.00	75.00
21"x6"	ea	13	65.00	65.00
18"x6"	ea	4	45.00	45.00
15"x6"	ea	4	42.00	42.00
12"x6"	ea	5	35.00	35.00
Storm sewer, VSP, sec M-6.8 a compl 6"	lf	100	3.10	3.10
VSP or PCP 12"	lf	2,100	5.20	6.20
15"	lf	350	6.70	8.70
18	lf	225	6.90	8.90
VSP or RCP under pvmt 21"	lf	650	10.00	14.00
24"	lf	325	13.00	16.00
27"	lf	400	20.00	23.00
VSP, encased or RCCP under pvmt 12"	lf	2,200	6.00	7.00
15"	lf	50	5.80	5.80
Underdr, compl 4"	lf	900	2.00	2.00
VSP, 6"	lf	17,900	1.50	2.10
T, pipe specials, 6x6"	ea	2	8.00	8.00
Catch basins, std, #1-3	ea	6	380.00	380.00
#3-C	ea	23	315.00	365.00
3-C, modified, compl	ea	24	335.00	335.00
#4-A w/salvaged casting	ea	3	200.00	200.00

Bids: 10-29-56 temls	Unit	Quantity	Unit Prices 1 C	Unit Prices EE
CB, special, compl	ea	38	375.00	425.00
Drain structs, std, #26, compl	ea	2	135.00	135.00
std, #26-C	ea	5	135.00	135.00
CB, rebuild & place MH frame & cov	ea	2	175.00	175.00
MH, std #1	ea	15	400.00	500.00
modified,	ea	11	325.00	375.00
MH, special compl	ea	12	335.00	385.00
without drop pipe, std #2.	ea	1	1,000	1,200
MH, castings adjust to grade	ea	23	25.00	25.00
Pipe encasement special compl	ls	1	550.00	550.00
CB, casting, #30, furn only if required	ea	1	65.00	65.00
frame #9 furn only if required	ea	1	50.00	50.00
cover #28 furn only if required	ea	1	30.00	30.00
Sidewalk Underdrains, compl	lf	60	1.00	1.50
Paved gutter, compl	lf	1,000	4.00	5.00
CB abandoned	ea	1	20.00	20.00
Culv box, abandoned, sta 81+12 compl	ls	1	750.00	750.00
86+71 compl	ls	1	150.00	150.00
Conc cl C, for structs	cy	45	75.00	75.00
Waterproofing, type A	sy	25	2.50	3.00
Reinf stl, sec M-7.1 intergrade	lb	2,400	0.16	0.16
RCCP sec M-6.6 b 18"	lf	130	6.00	6.00
36"	lf	24	15.00	15.00
sec M-6.6 b 29"x45" elliptical	lf	130	16.50	16.50
CMP fully bit ctd w/paved invert sec M-6.4 d, #8 ga ½" depth of corrugation, compl	lf	295	55.00	55.00
Bkfl, porous	cy	6	8.00	8.00
Agg, cr, bedding matl	cy	200	10.00	10.00

Bridge over West Creek

Excav bank, uncl	cy	480	5.00	5.00
rock	cy	460	10.00	10.00
Cofferdams, cribs & sheeting	ls	job	750.00	750.00
Excav for structs, uncl	cy	250	5.00	5.00
rock	cy	500	25.00	25.00
Conc, cl C, superstruct	cy	310	70.00	75.00
pier caps & columns	cy	210	85.00	90.00
abutments	cy	60	65.00	65.00
cl E, abutments	cy	55	64.00	64.00
pier & abutment ftgs	cy	190	40.00	50.00
cl C, sidewalk waring crse, 3", incl reinf mesh	sf	1,520	0.75	0.75
Waterproof bri sidewalk, type A	sy	200	1.00	2.00
Waterproofing, type A	sy	130	2.00	3.00
type B	sy	20	5.50	5.50
type C	sy	1,300	0.50	1.00
Stl reinf M-7.1 int gr	lb	158,000	0.14	0.14
Stl str WF beams incl field painting 33"	lb	316,000	0.17	0.19
misc incl field painting	lb	64,500	0.25	0.36
Expansion, jt filler, premolded, 1"	sf	120	1.10	1.10
Bri railing, stl	lf	371	20.00	21.00
Name plates, cast bronze, 18½"x26"	ea	2	200.00	200.00
Subdrain for wearing surf crse	lf	380	1.30	1.30
Scuppers, WI, w/pipe outlets incl field painting	ea	18	50.00	50.00
Bkfl, porous	cy	40	8.00	8.00
Poured jts in sidewalk	lf	1,200	0.15	0.16
Soil pipe CI in place 2"	lf	65	1.50	1.60
App slab, RC, with curb T-10", cl C conc	sy	180	16.00	16.00
Sidewalk, cl C conc, 6"	sf	269	0.70	0.80
Surf crse, asph conc method B, 1½" binder crse, T-50.08 & 1" wearing-crse, T-50.09, type B composition	sy	1,300	2.00	2.25

Pavement

Surf crse, method B, 1" wearing crse T-50.09 type B & 1½" binder crse T-50.08 #46	cy	30	20.00	20.00
Extra binder	cy	20	20.00	20.00
Surf crse, asph conc, drives, T-50.10, type C	cy	15	21.00	21.00
Pvmt RPCC, 8" for drives	sy	50	7.00	7.25
9"	sy	45,200	7.00	6.95
Integral conc curb, 6x7"	lf	17,900	0.90	1.10
Agg stabilized, cr, should & approaches	cy	75	10.00	10.00
Insul course, 3"	sy	65,250	0.80	1.10
Agg base course, 6", base crse, method A, 6"	cy	40	10.00	10.50
Tack coat, bit, 0.10 gal/sy	gal	50	0.30	0.30
Prime coat, bit 0.35 gal/sy	gal	120	0.30	0.30
Sand for covering tack & prime coat	t	2	4.50	4.50

Waterwork

Serv conn, plug	ea	1	70.00	70.00
extend	ea	4	50.00	50.00
Valve box, reset	ea	3	30.00	30.00
Hydrant & plug 4" branch at Main, remov	ea	2	300.00	300.00
Hydrant & hydrant branches	ea	2	800.00	800.00
Valv box casting, any type furn only if required	ea	1	45.00	45.00

Continued on following page

"We like its power and speed"

That's what manager E. J. Adcock of the R. B. Tyler Co., Jackson, Mississippi, says about the Adams 660 motor grader. After working the big machine for a couple of years, Adcock is especially impressed with its performance and ease of operation.

Photographs on this page were taken as Tyler's "660" bladed a median strip on East-West U.S. Hwy. 61, between Natchez and Washington, Mississippi. The company was building a second lane to complete 4.4 miles of 4-lane divided highway.

Power for profitable production grading

Manager Adcock likes Adams' ability to take a big cut and muscle thru the tougher jobs. He's looking for production—and getting it! 8 forward speeds—1.3 to 26 mph—and 4 reverse gears—1.1 to 13.7 mph—cut job-time, do every grading operation at fastest practical rate. Adcock also likes the ease with which operator maneuvers the 28,000-lb. machine, cuts smooth finish grades, and travels in traffic at 26 mph between jobs.

Clear view of his work, and double-action brakes, give Operator Frank Freeman confidence to blade at time-saving speeds.

Does difficult jobs fast

J. E. Polston, superintendent, finds Adams' work-horse ability and rugged construction keep his jobs ahead of schedule. Polston makes the most of "660's" road speed as he schedules it from one task to another, keeps his men and machines working at top capacity. On the U.S. 80 job he used the "660" to spread fill behind earthmovers, dig drainage ditches, scarify crossings and hard clay, cut high bank-slopes, level subgrade, and bring center strip to grade.

Easy handling . . . good ride . . . less maintenance

Operator Frank Freeman had always been partial to a competitive-make grader. In the jargon of the road crew, he was a "—" man . . . he thought there were no other graders *until he worked the "660"*. Now he says Adams is "the best". Frank likes the heavy-welded front-end construction with fully-enclosed leaning wheel mechanism—"that is tight and stays in adjustment." The ride is comfortable, rubber engine-mounts isolate vibration, foam-rubber pads the seat. He likes the way it handles, with mechanical hydraulic power steer, dual action brakes, and handy foot accelerator. Freeman feels that 13.7 mph reverse helps him get more work done, says the Adams "can back-up a quarter mile in the time some graders take to turn around".

You'll like Adams too!

You'll like their cost-cutting work capacity . . . 26 mph get-up-and-go . . . time-saving maneuverability—operator comfort. You'll like the range of sizes . . . 80, 104, 123, 150 hp . . . a grader for every size job. Why not telephone your LeTourneau-Westinghouse Distributor, right now, and ask for a demonstration?

AG-15-H-b

LeTourneau-WESTINGHOUSE Company, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

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for WRECKING-SMASHING
FREDERICK CAST Semi-Steel
DROP BALLS

Tough, rugged Frederick Drop Balls eliminate expensive drilling, blasting . . . deliver smashing low cost power when you want it, where you want it. Exclusive "Pear-shape" design drops straight—swings true—withstands greater impact. Balls 4000 lbs. or over are made of extra durable nickel alloy—or special alloys furnished on request. "E-Z" Swing recessed steel eye gives greater cable protection plus free swinging action. Balls can be furnished with replaceable pins. Use Frederick Cable Weights (135 & 250 lbs.) and Frederick Swivels on all size balls for true, safe cable performance. Special release hooks for free dropping also available.

Wide range of sizes and weights:

Pear shape (lbs.)......	1500	2000	3300	4000	5200	6500	8000
Ball shape (lbs.)......	500	1000	2000	5200			
Spherical shape (lbs.). (for magnet use)	470	950	1650	2400	3000	3700	5400

Write us today for prices and illustrated literature; order Balls direct or see your nearest Equipment Dealer.

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Makers of Manhole Frames, Covers and Steps • Storm Gratings
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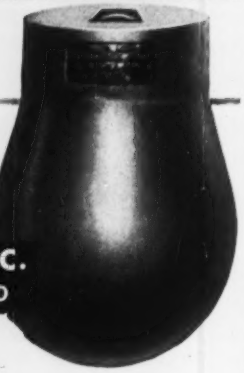
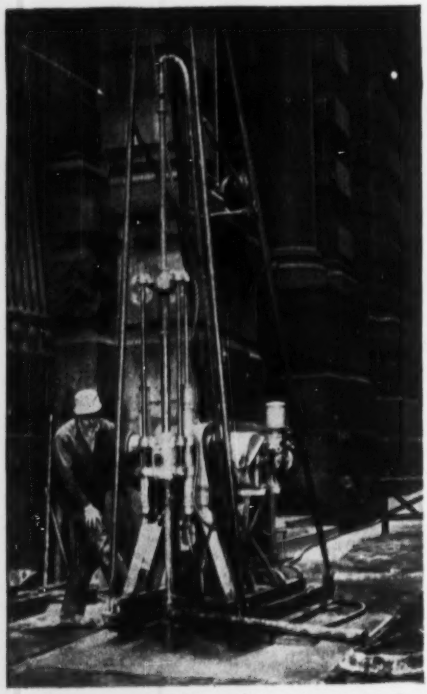




This Acker Teredo Drill is Making Foundation Test Borings preparatory to Erection of a New Skyscraper.

on the sidewalks of New York

Here's one of two Acker Teredo Diamond Core Drills on the job for Raymond Concrete Pile Company, making foundation test borings in the heart of the busy financial section of New York City. As repeat purchasers of Acker drills, Raymond knows the dependability, compactness and versatility that characterizes Acker **design.**

For prices and information, write for Bulletin 30, ENR.

ACKER DRILL CO., Inc.
725 W. Lackawanna Avenue
Scranton, Penna.

Ohio Highway

Continued from preceding page

Labor

			IC	EE
Crane	hr	10	20 00	20 00
Air Compressor	hr	30	6 30	6 30
Truck	hr	40	5 60	5 60
Skilled labor	hr	40	4 30	4 30
Intermediate grade, labor	hr	60	3 60	3 60
Unskilled labor	hr	120	3 35	3 35
Barricades, danger & warning signs, flagmen & watchman	ls	ob	930	1,040

To be completed: 12-1-56
No liquidated damages

Highway Relocated for St. Lawrence Power Project

Relocation of State Highway Route 37, including one 300-ft and one 75-ft structural steel bridge, for the Power Authority of the State of New York will cost $2,231,451. This 5.9-mile highway section with a 24-ft roadway and 10-ft shoulders is between Waddington and Coles Creek in St. Lawrence County. Uhl, Hall & Rich, Boston, Massachusetts, are consulting engineers.

The Contract went to S. J. Groves & Sons of New York on prices 16% and 25.5% below the two other bids.

Major work includes: 800,000 cu yd of excavation for roadway, railroad, diversion channels, borrow and structures which takes 29.75% of the total price; 2½-in. plant-mix asphaltic concrete pavement placed on a gravel foundation course and on a 4-in. broken stone and a 3-in. bituminous macadam base course, 22.85%; reinforced concrete in bridges, abutments, piers and decks, in culverts sidewalks and manholes accounts for 16.75% and a railroad line with 6,580 lin ft of track and switches for 4.65%. The remaining 26% goes to the embankment, a dike, drainage, seeding, sodding and miscellaneous work.

The contractor priced at $0.75 per cu yd excavation for ditches channels, borrow and the railroad, while the unsuccessful bids ranged from $0.80 to $1.75 per cu yd. The $3.50 per cu yd contract price for structural excavation compares to other bids at $4.50 and $6.15 per cu yd. The contractor was high on concrete in bridge abutments and piers which he priced both at $70 per cu yd as compared to low bids of $55 and $58 per cu yd. Concrete in culverts and bridge decks is priced $110 per cu yd under the contract and from $78 to $90 per cu yd by the other bidders. Railroad track drew bids from $6.50 to $9.00 per lin ft.

The drainage requires 4,290 lin ft of 18-in. at $6.50 to 84-in. at $100 per lin ft reinforced concrete or corrugated metal pipe and 4,600 lin ft of 6-in. perforated corrugated metal underdrain at $3.00 per lin ft.

The Power Authority furnishes 600,000 lb of structural steel.

The three bidders are:

Continued on following page

Have you seen the brand-new C Tournapull with increased-capacity "Fullpak" scraper? It's lower, wider, better-than-ever! Loads faster, boils easier . . . heaps 18-yd. pay-loads for more profitable dirtmoving. Ask for details.

◀ Loading from ledge, Tournapull-Tournatractor team speeds dirtmoving operations on 90-acre housing project. Contractor E. R. Fenwick found one Tournatractor sufficient to push-load his 3 high-capacity "C's", and keep them busy moving wet, red shale.

Level 90,000 yds. of red shale for future 400-home subdivision

To cut and fill a hilly 90-acre site in preparation for the erection of 400 homes, Everett R. Fenwick of Matawan, N.J., employed 3 C Tournapulls to haul dirt . . . and a dozer-equipped Tournatractor to push-load the "C's" and handle clean-up.

This project, known as Roosevelt Park Housing Development, at Woodbridge, N.J., is being built by Sommer Brothers of Iselin, N.J. — who hired Fenwick for the 90,000-yd. cut-and-fill work. Material was red shale . . . heavy, difficult to load, and wet.

Average pay-load of high void shale picked up by Tournapulls was 10 cu. yds. On a round trip distance of 816′ cycle-time was 3 min. 5 sec., average. "Pulls" had to climb a 15% grade on return trip. Because of scattered areas of cut and fill, no haul-road, as such, was possible. "C's" had constantly rough hauls.

"Tops for big jobs"

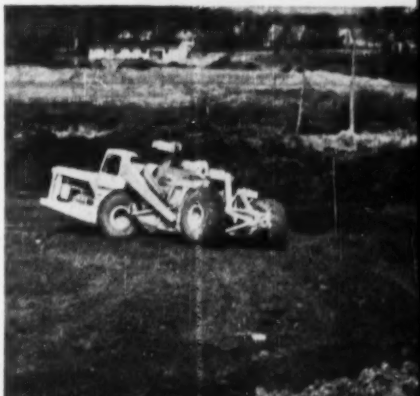
"C Tournapulls are tops for big earthmoving work", Fenwick said. "I also have two D Tournapulls, which I use on smaller assignments. The combination of the two makes it possible for me to handle any type of earthmoving job with confidence."

"My Tournatractor has also proven itself to me by solid performance and utmost economy on many projects," he added.

Tournapulls can help you

You may have a job similar to those successfully handled by this New Jersey contractor. If so, you can benefit from Tournapull's rubber-tired mobility and easy to handle electric-control system. Let us show you owner-verified facts on Tournapull and Tournatractor performance. There's a size and type machine to do *your* job in less time, at bigger profit!

C Tournapull loads fast, packs big yardage in bowl. Dozer-equipped Tournatractor has power and speed to push-load "C" fast.



C Tournapull spreads load, then uses 90° power-steer to swing around in turn leaving fill. Maneuverable "C's" work handily in narrow spaces . . . ride smoothly.

Fullpak—Trademark, Tournapull, Tournatractor—
—Trademark Reg. U.S. Pat. Off. P-1004-B-b

LeTourneau-WESTINGHOUSE Company, PEORIA, ILLINOIS
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IF IT'S A

PLAY SAFE! ASK FOR A
DEWATERING ANALYSIS BY

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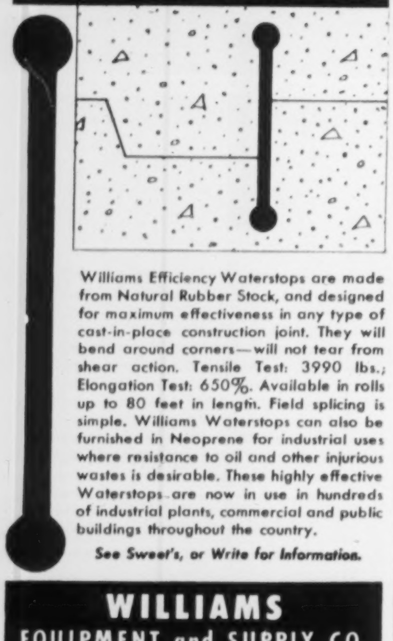
RUBBER
WATERSTOPS
FOR MASONRY CONSTRUCTION JOINTS



Williams Efficiency Waterstops are made from Natural Rubber Stock, and designed for maximum effectiveness in any type of cast-in-place construction joint. They will bend around corners—will not tear from shear action. Tensile Test: 3990 lbs.; Elongation Test: 650%. Available in rolls up to 80 feet in length. Field splicing is simple. Williams Waterstops can also be furnished in Neoprene for industrial uses where resistance to oil and other injurious wastes is desirable. These highly effective Waterstops are now in use in hundreds of industrial plants, commercial and public buildings throughout the country.

See Sweet's, or Write for Information.

WILLIAMS
EQUIPMENT and SUPPLY CO.
17928 Kinross, Birmingham, Michigan

Highway Relocation, N. Y.

Continued from preceding page

1C	S. J. Groves & Sons, Co., N. Y., N.Y.	$2,231,451
2	D. W. Winkelman Co. Inc. Syracuse, N.Y.	2,655,425
3	A. S. Wikstrom Inc., Skaneateles, N.Y.	2,997,028

Bids: 9-6-56 Items	Unit	Quantity	Unit Prices 1 C	2
Excav, uncl for RR	cy	216,000	$0.75	$1.07
for drain ditches	cy	15,000	0.75	1.28
for diversion channels	cy	107,000	0.75	0.84
borrow	cy	475,000	0.75	0.80
Embkmt, for RR	cy	552,000	0.10	0.35
for dike	cy	142,000	0.20	0.30
Watering	gal	5,000	3.50	3.44
Spec rolling, pneumatic	hr	50	18.00	24.00
segmented, self propelled roller, or sheepsfoot roller	hr	50	18.00	24.00
Riprap dumped quarried rock	cy	12,300	8.00	10.30
Dumped boulder riprap	cy	8,200	4.00	5.50
Cr rock or grav blanket	cy	7,800	4.00	6.46
Dry rock paving	sy	80	8.00	6.00
Gravel toe blanket	cy	1,500	4.00	6.90
Fndn crse gravel	cy	45,200	3.00	7.00
Base crse, broken stone	cy	11,600	8.50	7.00
bit macadam	cy	8,200	7.50	7.00
Bit matl penetration, method	gal	123,000	0.22	0.24
Asph conc, plant mix	t	13,900	11.00	10.50
Stabilized shoulders	cy	2,100	13.00	10.70
Bit matl, A	gal	31,800	0.22	0.24
Cable guide railing f&i for rr rail posts	lf	8,150	3.40	3.00
Delineators hwy, f&i	ea	200	7.00	6.00
with steel posts	ea	500	7.00	6.00
Ballast, f&p	cy	3,400	6.00	6.70
Cross ties, f&p	ea	3,800	8.40	9.20
Track, f&i	lf	6,580	6.50	7.20
Bumper, f&i	ea	1	425.00	470.00
Switches, f&i	ea	6	1,400	1,530
Excav. uncl for structure	cy	15,500	3.50	6.15
Compacted bkfl for structures	cy	24,000	1.30	1.20
Conc in bri abutments	cy	1,200	70.00	55.00
piers	cy	2,200	70.00	58.00
decks	cy	550	110.00	85.00
culverts & weir	cy	150	110.00	78.00
curbs, sidewalks, catch-basins, inlt & MH	cy	160	110.00	110.00
Reinforcement bars	lb	260,000	0.16	0.17
Str stl for bris erect	lb	583,000	0.05	0.03
Metalwork misc, f&i	lb	4,000	0.40	0.70
Membrane waterproofing, f&i	sf	18,200	0.60	0.42
Jt filler premoulded	sf	300	0.50	0.55
sealer expansion	lb	1,000	0.15	0.21
RCP or CMP culv, 18" f&i.	lf	2,050	6.50	7.00
24"	lf	330	9.00	8.50
30"	lf	270	11.00	10.00
36"	lf	190	16.00	16.00
48"	lf	110	24.00	22.00
RCP, 42" f&i	lf	390	27.00	26.00
54"	lf	440	43.00	37.00
84"	lf	510	100.00	69.00
CMP, perf. 5" underdr, f&i	lf	4,600	3.00	1.50
Arch culv CM f&i	lb	53,500	0.34	0.26
Screened gravel	cy	200	4.50	9.00
Seeded topsoil	ac	20	800.00	1,000
Seeding	ac	95	335.00	350.00
Sodding	sy	1,000	1.75	1.25
Furnishing performance & labor and matl bonds	ls	job	15,000	13,350

To be completed: 6-1-58
Liquidated damages: $200 per day

$3.6-Million Highway With Five Bridges in California

Graded roadbeds for a four-lane divided highway, frontage roads, ramps and connections, plant mixed asphaltic concrete pavement and five bridges feature this project of the California Department of Public Work in Sacramento. G. T. McCoy is state highway engineer and H. C. McCarty is office engineer for the department. This 6.1-mile section of U.S. Highway 40 is between Heather Glen and Colfax in Placer County, Calif.

McCammon-Wunderlich Co. and Wunderlich Contracting Co., Palo Alto, Calif., teamed up for the $3,601,981 low bid that took the contract at a price 2.4% below the second low and 18.5% below the high ninth bid.

The contractor has 300 working days to complete the work which includes the removal of a bridge, clearing grubbing, excavation of ditches and channels, reinforced concrete, drainage structures and concrete curbs, gutters, sidewalks and driveways. He must also furnish and install monuments, markers, fences, reinforced concrete, corrugated metal and galvanized steel drain pipe and install a complete lighting system to be furnished by the department.

The typical cross section of the highway includes two 24-ft roadways with 5-ft inner shoulders, a 10.5-ft outer shoulder on one side and an 8-ft outer shoulder protected by a 0.5-ft-high dike on the other side. The two roadways are separated by a 12-ft median surfaced with a 6-in. layer of cobblestone.

Roadways are surfaced with 3-in. plant mixed type A asphaltic pavement and a 0.7-in. open graded plant mixed surface placed on an 8-in. cement treated base, on a 4-in. untreated subbase. Shoulders are 1.5-in. to 3-in. plant mixed surfacing on a 12-in. untreated base.

Specifications require that the plant mixed surfacing conforms to Class F of the classification set forth in BPR Memorandum to District Engineers, dated January 1934.

Of the five bridges, two carry the freeway over Southern Pacific track, two are overcrossings to carry vehicular and pedestrian traffic over the freeway and the fifth is a highway grade separation for Routes 25/37.

Both railroad crossings are pairs of similar welded structural steel girders, each carrying twin 28-ft roadways. The three-span 192-ft crossing of the main line and a spur is on reinforced concrete abutments and two concrete pile bents.

The four-span, 232.5-ft crossing over the eastbound track is supported on reinforced concrete abutments and column bents on spread footings.

Both overcrossings of the freeway are two-span reinforced concrete tee-beam bridges with 28-ft roadways and 5-ft sidewalks. Both are supported on reinforced concrete abutments and a center bent on reinforced concrete spread footings. The larger, 129.33 ft, crosses the freeway and an off-ramp. The other, 117.67 ft, crosses the freeway and an acceleration lane.

The routes 25/37 separation is a welded steel girder, just over 126.5 ft, in two spans on abutments and a bent similar to the other overcrossings with 28-ft roadway and 5-ft sidewalk. But an existing bridge it to be removed and disposed of.

The contractor will route traffic partly through construction operations around the work over an existing travelled way. He has to provide at least two surfaced traffic lanes, each at least 12 ft wide.

In accordance with Section 115 of the Federal Aid Highway Act of 1956,

Continued on following page

Take a New Look at Tournatractor

Consider these many advantages on your work, now and in your future:

Power...208 hp — more than any crawler tractor in its class...with less pounds-pull in the starting speeds, but more pounds-pull in the working speeds used most of the time. Operators work at higher speeds, with more yardage moved per day.

Traction...greater than ever! New, optional wide-base tires give still more ground contact area and better flotation in many soil conditions. Additional traction, when needed, is easily obtained by hydro-flating.

Speed...forward to 17.4 mph, and reverse to 7.3 mph. Instantaneous shift through constant mesh...no loss of momentum. Instant controls. Anti-friction bearings throughout power train cut power loss, give more use of speed.

Mobility...Tournatractor travels twice as fast as crawlers to reach on-the-job assignments and to travel job-to-job under its own power. Saves time and cost of hiring flatbed haulers and extra help to load and unload.

Shifts instantly...no stops, no lost momentum...gear ratios changed instantly by Tournatractor's constant-mesh transmission. Saves at least 5 seconds on every gear shift, as much as 80 minutes per 10-hour day.

Torque converter...a simple, trouble-free, low-pressure unit with single impeller, reactor, and turbine. Eliminates shock-loads, automatically increases engine torque to match load, provides unlimited speed-flexibility, increases operator efficiency.

Husky, all-welded case...provides a sturdy base. Moving parts are held in perfect alignment, last longer. All parts easily accessible through handy cover-plates. No independent oscillating assemblies to spring out of line.

Anti-friction gear-trains . . . heavy-duty, precision-cut gears mesh smoothly. Special heat-treating produces wear-resistant surface on tough cores. Constant oil-bath reduces wear. Shafts ride on anti-friction bearings, reducing power-loss and wear.

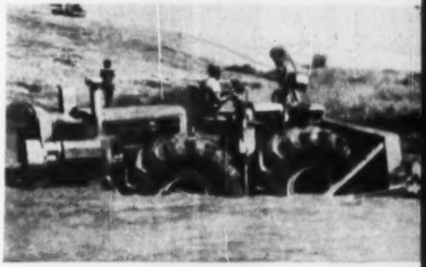
Grouped lubrication through fewer fittings, oil enclosures, and far fewer moving parts, combine to save operator about 5 min. work-time each shift. Sealed protection keeps abrasive dust, mud, water and other elements sealed out...lubricants sealed in. Saves lubricants, saves time, saves wear.

4 tires vs over 500 track parts...four tough tires eliminate multitudes of exposed wearing parts such as track rollers, bushings, pins, shoes, and seals. Reduces service, cuts costs.

Safe to operate...low center of gravity, all-around visibility, accessibility and quick response of controls, make Tournatractor exceptionally safe to operate. Multi-disc air brakes have *four times* the braking surface of most heavy-duty tractors.

Interchangeable equipment...Bulldozer, Angledozer, Root-Rake, Snow-Plow — all interchangeable — extend Tournatractor usefulness in a wide work-range. Tilt-mechanism and down-pressure attachment on dozer also available. Tournatractor pulls any type drawbar equipment.

Tournatractor can tackle tough jobs, such as breaking up rock-seams, pavement, etc. Faster push and return save time. On long cycles, on-job and between-job moves, Tournatractor speed is doubly important.



Tournatractor's sealed power-train permits travel through water, mud, dust without loss of power. Lubricants are not washed away nor filled with abrasives. Maintenance is less since 4 wheels do work of 500 track parts.

Tournatractor takes shortest route to job, via highway or cross-country. It drives through city streets without interference to traffic . . . big, low-pressure tires do no damage to black-top, curbs, or railroad-tracks.

Tournatractor travels and works over any type of footing to clear land, push-load scrapers, dig ditches, spread fill, stockpile materials, maintain haul roads, back-fill around culverts, pull other equipment.

See Tournatractor work on one of your own jobs

The best way to judge today's improved Tournatractor is to see it in action on one of your own jobs. Why not give us a call? We'll be glad to arrange a demonstration on your regular work. Only in this way can you really compare your bonus profit possibilities with Tournatractor to those with your present heavy-duty tractor equipment.

Tournatractor, Angledozer—Trademark Reg. U.S. Pat. Off. CT-1104-G-bw

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BUILDERS RISK INSURANCE

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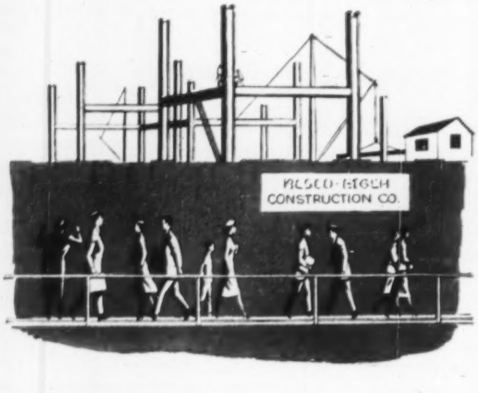
National Surety's facilities have been broadened to include the issuance of this essential protection throughout construction. This coverage is available nationwide through a network of top independent insurance agents and brokers.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INVISIBLE ARMOR

NATIONAL SURETY
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These pumps turn "tough" jobs into "PROFIT" jobs!

FROM 1" TO 10"
CMC DUAL PRIMERS

Contractors "in the know" insist on CMC Dual Primers! They've learned from on-the-job experience that they can rely on the exclusive features of these pumpers to give FASTER DUAL PRIMING — MORE DEPENDABLE OPERATION — LONGER LIFE WITH LESS MAINTENANCE. Get full details today.

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Capacities to 240,000 G.P.H.

●

Also a complete line of 3" and 4" Diaphragm Pumps, gasoline engine and electric motor models. 1 and 2-stage Hi-Pressure Pumps. WRITE FOR FREE LITERATURE.

- **Dual Volutes**
- **Self Cleaning Case**
- **Lighter Weight**
- **Long Life Seal**
- **Half the Parts**
- **Unitized Construction**

California Highway

Continued from preceding page

minimum wage rates in the immediate locality include $2.325 for general labor, $2.425 for slopers, $2.575 for form raisers and concrete pan workers, $2.575 to $2.775 for pipe layers, $2.325 to $3.06 for truck drivers, $2.595 to $3.425 for power equipment operators, $3.15 to $3.40 for iron workers and $3.50 for electricians.

General prevailing wage rates in accordance with Section 1770 of the Labor Code of the State of California range from $2.625 to $3.50 for skilled labor, from $2.325 to $2.595 for intermediate grade labor and are $2.325 for unskilled labor.

The nine bidders include:

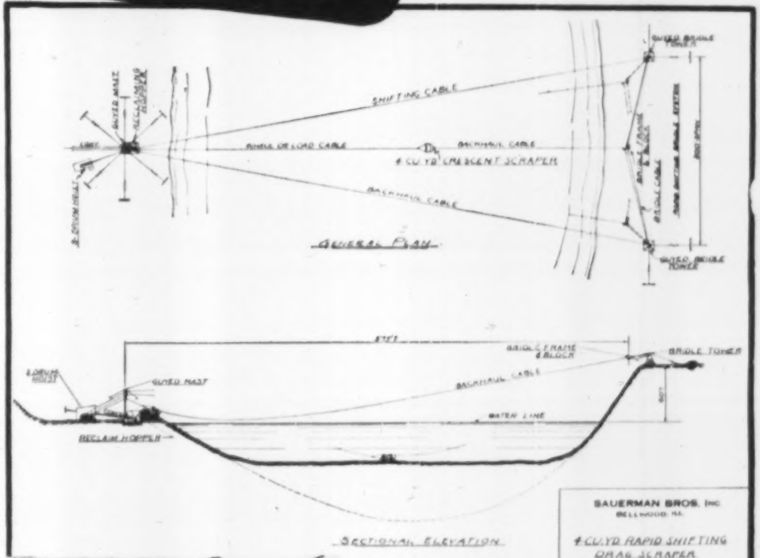
1C	McCammon-Wunderlich Co. & Wunderlich Contr. Co., Palo Alto, Calif	$3,601,981
2	Baldwin Contr. Co., Inc. & H. Earl Parker Inc., Marysville, Calif	3,694,959
9	Parish Bros. Inc., Benicia, Calif	4,421,368

Bids: 11-7-56 Items	Unit	Quantity	Unit Prices 1 C	 2
Exist bri, remov	ls	job	$52,792	$10,225
Clear & grub	ls	job	208,996	40,000
Wat sup, develop & wat equip furn	ls	job	168,570	50,000
Water, apply	Mgal	84,600	0.25	1.60
Original ground compact	sy	117,800	0.10	0.05
Exc roadway	cy	1,793,200	0.48	0.60
structure	cy	17,620	5.00	3.20
Bkfl structure	cy	12,950	7.00	5.75
Exc ditch & channel	cy	11,700	1.50	0.63
Overhaul	stay	14,000,000	0.005	0.005
Untreated base	t	168,400	1.50	2.24
Base, cmt treat mix spread & compact	sy	173,400	0.30	0.25
Portland cement	bbl	20,200	4.50	5.33
Agg, mineral, cmt treat base	t	76,000	1.05	1.82
Asph emulsion curing seal, paint binder & seal coat	t	275	34.00	52.50
liquid, SC-2 prime ct & penene treat	t	230	33.00	38.00
paving, plant mix surf	t	3,170	6.50	33.20
Agg, mineral, type A, plant mix surf	t	54,300	6.50	4.32
open graded, plant mix surf	t	5,350	8.00	8.15
Plant mix surf, ditch & spillway dash drains	sy	1,740	1.00	1.60
Dikes, plant mix surf pl.	lf	33,600	0.30	0.27
Sand cover, curing seal, paint binder & seal coat	t	210	6.50	5.30
Conc, cl A, struct	cy	375	100.00	88.00
bridges, 3,940 cy	ls	job	236,400	306,000
Mortar, air blown	cy	530	40.00	81.50
Waterstops, rubber	lf	574	2.00	2.90
Bar, reinforcing steel	lb	27,600	0.13	0.12
bridges, 622,000 lbs.	ls	job	82,600	68,420
Reinf mesh	sy	4,260	1.00	1.00
Piles, conc, furn	lf	2,230	5.00	3.90
Piles conc drive	ea	80	200.00	147.50
Steel, struct, 792,000 lbs	ls	job	175,000	175,760
Iron & steel, misc	lb	7,700	0.63	0.38
Drop inlet frames & grates	ea	18	140.00	94.00
met plate covers	ea	61	120.00	94.00
Railing, steel	lf	3,033	4.00	7.30
Clean & paint struct steel	ls	job	4,485	20,000
Conc, cl B, curbs, gutters, sidewalks, & driveway	cy	1,120	40.00	37.00
Monuments, r/w	ea	269	6.00	7.70
survey	ea	36	15.00	13.20
Riprap, light stone	cy	315	10.00	37.50
Grout, conc	cy	30	50.00	34.50
Cobblestones	t	7,700	3.00	2.90
Guard railing, met plate	lf	440	5.00	4.50
placing salv	lf	980	3.00	2.20
Culv marker, clear marker & guide posts	ea	910	6.00	7.15
Guide posts, remov & reset	ea	20	5.00	4.40
New property fence, type A	mi	9.6	2,700	2,439.50
type B	mi	1.2	2,700	2,090
gate, 10′	ea	1	50.00	49.50
12′	ea	1	60.00	55.00
14′	ea	5	70.00	60.50
gate walk fence	ea	1	35.00	27.50
Fence, link 72′	lf	11,150	2.50	1.65
RCP, extra str, 60″	lf	1,600	39.00	29.00
CMP, 8″ 16-ga	lf	2,510	2.60	2.50
12″, 16-ga	lf	2,300	3.50	3.20
18″, 16-ga	lf	1,380	5.00	4.35
24″, 14-ga	lf	3,320	6.50	7.00

Continued on following page

the SAUERMAN METHOD.....

Scraper Machines Engineered to Your Operation



Above drawing was prepared for a specific drag scraper installation and does not represent maximum spans.

View shows rapid shifting bridle frame and all operating cables. Crescent may be seen in background conveying load to reclaiming hopper just in front of mast.

•

Contact Sauerman's engineering department for specific recommendations and information. No obligation.

Ask for Catalog A, Drag Scrapers—24 pages of job photos and specifications. Request Field Reports showing your material being handled by the low cost Sauerman Method.

The Sauerman Method works equally well over widely differing areas and span limits . . . on hills, swampy ground or underwater . . , handles any material a dragline can dig.

Every scraper machine is powered by a Sauerman Roller Bearing Hoist, especially designed to withstand sudden shocks and changes in speed.

When a rapid shifter is used, a third hoist drum is added to shift the bridle frame. The rapid-shifting bridle system (upper right of drawing) permits frequent shifting of the scraper's line of operation in non-caving material, shallow excavations or overburden.

Operating costs are lower—basically, it is cheaper to drag material than it is to lift and transport it. You eliminate the power costs of moving heavy machinery about the area. You pay only for pay loads—not dead weight. When expendable parts—sheaves, clutch or brake linings—are replaced, the machine is restored to practically new condition.

Sauerman can help you select the method of materials handling most profitable for your job—a system that will give you the lowest cost per cu. yd. handled.

SAUERMAN BROS. INC.

632 S. 28th AVE. **BELLWOOD, ILL.**

Crescent Scrapers • Slackline and Tautline Cableways • Durolite Blocks

When time counts,
beat the clock with
ALUMINUM & STEEL

SPEED-LAY

LIGHTWEIGHT PIPING FOR
TEMPORARY & SEMI-PERMANENT USE

Factory-packaged, SPEED-LAY is ready for installation on delivery. Complete with pipe . . . couplings . . . fittings . . . valves . . . accessories.

Easy to lay, SPEED-LAY saves vital man hours. One unskilled man can do the whole job in jig time . . . Write for FREE brochure describing the SPEED-LAY piping system.

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MONITOR
NOZZLES
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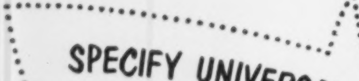
No. H343
Marine and
Industrial Type
"Universal"
MONITOR NOZZLE

Horizontal and vertical swivel joints permit universal motion, allowing the nozzle to cover large areas from one point of operation. Made in all sizes to meet your requirements. The stream is solidified by internal splitters in bodies and playpipes. All types are cast bronze construction, finished in "fire red" enamel with polished brass trim or chromium plated trim. These nozzles can also be supplied with automatic safety stops.

STABILITY *since* 1854



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MONITOR NOZZLES ARE ONE OF HUNDREDS OF BRONZE PRODUCTS MANUFACTURED BY M. GREENBERG'S SONS FOR THE PAST 103 YEARS.

California Highway

Continued from preceding page

Bids: 11-7-56 Items	Unit	Quantity	Unit Prices 1 C	2
CMP 30", 14-ga	lf	1 490	9 00	8 30
36", 12-ga	lf	1 720	14 00	13 30
36", 10-ga	lf	316	18 00	14 90
42", 12-ga	lf	280	21 00	15 50
42", 18-ga	lf	1,470	24 00	22 00
48", 12-ga	lf	1,100	22 00	19 45
54", 8-ga	lf	384	35 00	33 93
CMP perf. underdrains, 8"	lf	1,270	2 50	2 50
Filter maierial	cy	225	4 00	5 85
Entrance tapers, for metal pipe 8"	ea	31	55 00	47 15
CMP downdrains, 8"	lf	410	2 50	2 40
Downdrain slip jts	ea	4	50 00	40 85
Special pipe slip jts, type A	ea	12	40 00	48 30
Finish roadway	ls	job	25,000	52 50
Raised traffic bars	lf	300	2 50	2 15
Debris racks	ea	3	1,200	300 00
Pipe, galv steel 1"	lf	480	0 60	0 95
1½"	lf	920	1 00	1 25
2"	lf	780	1 40	2 20
Highway lighting sys	ls	job	61,000	20,913.50

Iowa Resurfaces Highway

Two contracts for a new 1½-in. asphaltic concrete surface course placed on a cleaned old base on Iowa Highway sections went to Land Construction Co., St. Joseph, Missouri. The $57,939 total is 5.2% below the second and 14.3% below the high third bid. Both projects of the Iowa State Highway Commission in Ames are located on U. S. Highway No. 69 in Polk County. John G. Butter is chief engineer for the Commission.

The smaller contract covers 2.111 miles for $25,168 and the other for 2.756 miles amounts to $32,771.

The three bidders on the two contracts are:

1C	Land Const. Co., St. Joseph, Mo.,	A	$25,168
		B	32,771
2	Kaser Const. Co., Des Moines, Iowa,	A	26,515
		B	34,621
3	Green Const. Co., Des Moines, Iowa,	A	29,321
		B	38,285

Bids: 9-19-56 Items	Unit	Quantity	Unit Prices 1C	2
A 2.111-mile section				
Clean & prep of old base	mi	2 111	$150 00	$300 00
Tack coat	gal	2,080	20	0 23
Sand	t	74	3 00	6 00
Asph conc, type A, surf course	t	2,424	9 50	9 75
Asph cement, incr or decr	t	per t	28 00	27 00
Cr stone, cl A, on should	t	279	4 25	4 75
B 2.756-mile section				
Clean & prep of old base	mi	2 756	$150 00	$300 00
Tack coat	gal	2,717	0 20	0 23
Sand	t	97	3 00	6 00
Asph conc, type A, surf course	t	3,165	9 50	9 75
Asph cement, incr or decr	t	per t	28 00	27 00
Cr stone, cl A, on should	t	364	4 00	4 75

Work started: 9-24-56 **To be completed: 11-3-56**

Ohio Highway Job Includes Channel Relocation

This 3.6-mile reinforced concrete highway with bridges will be the connecting link on Pleasant Valley Road between Brecksville and Alexander Roads in Cuyahoga County, Ohio, a continuous cross county road for Cuyahoga County Commissioners, Cleve-

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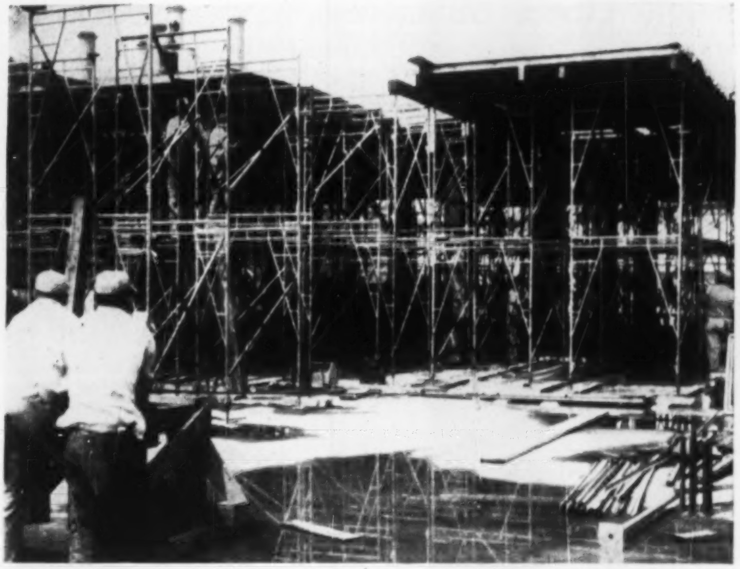
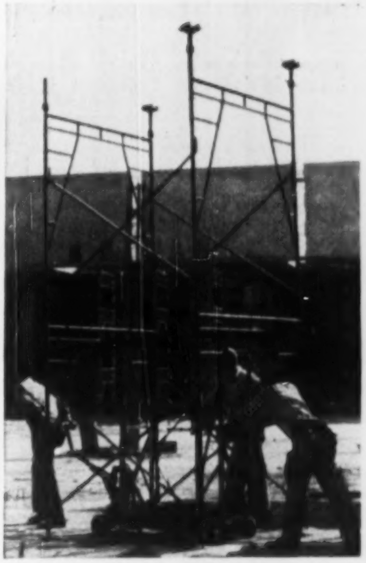


THIS UNIQUE SYSTEM of moving complete sections of shoring to new pour areas is used by Wigton-Abbott Corp., Plainfield, N. J., to eliminate the job of disassembling and reassembling the shoring. Eleven "Trouble Saver" Sectional Shoring units, each covering 720 sq. ft., are pulled on wood sills by a hand winch. Each unit was slid three times for succeeding concrete pours during construction of the 189' x 231' Monsanto Chemical Co. warehouse, Kearney, N. J. Form work was "permanently" placed on those sections between drop heads.



WHEELED HYDRAULIC dolly is used to move four-frame unit of "Trouble Saver" Shoring to next pour. This system speeds operation for William J. Moran Co. on Emporium-Capwell Co. warehouse covering a city block in Oakland, California. 3,600 frames were used on this building.

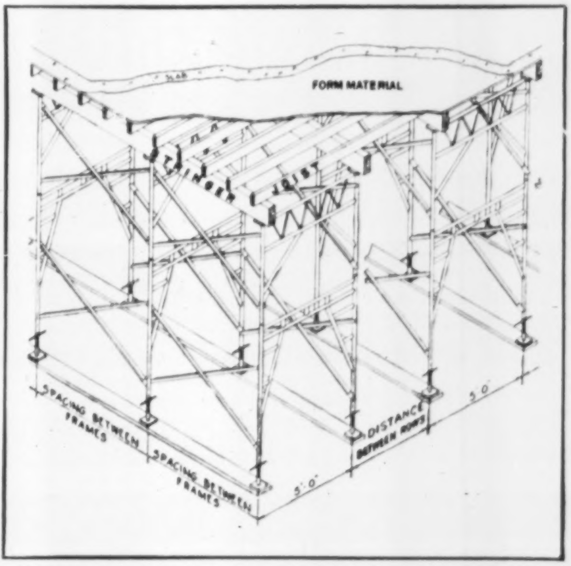
Good Planning Cuts Shoring Costs

ONE OF THE MOST IMPORTANT advantages of modern sectional steel shoring is the fact that it can be planned on the drawing board. Load bearing strength can be accurately calculated, the number of units pre-determined and the whole installation laid out to assure greatest efficiency on the job.

It is during this planning period that the engineering ability, experience and imagination of The Patent Scaffolding Co. Inc., pays dividends to the contractor. For when a shoring installation is properly laid out on the drawing board, a lot of time, money and trouble are saved on the job.

First, PS Co. helps the contractor select the right kind of shoring by carefully studying the character of the job. Contractors planning with PS Co. have a choice of three types of steel shoring: "Trouble Saver"® Sectional, "TubeLox"® tube and coupler type Shoring and Burton's single post Shores. Once selected, the shoring is laid out to carry the desired loads with an adequate factor of safety and also to get maximum re-use from the number of units needed. Unique methods of rolling, sliding and lifting entire sections of sectional shoring from one pour area to another are often worked out at this stage too.

The complete story on PS Co. Shoring can be found in Bulletin PSS-33 "Modern Shoring for Concrete Construction". It's available at no obligation from the Patent Scaffolding Co., Inc.



SAFE WORKING LOADS for "Trouble Saver" Sectional Steel Shoring vary according to spacing between 5'-wide frames, distance between rows, and position of stringers on frames. This prefabricated, engineered shoring will handle the heaviest loads and provides a clean, neat installation. It is easily adaptable to all types of construction: flat slab, slab with drop head, pan joist, poured arch and beam.

FOR GREATER SAFETY...EFFICIENCY...ECONOMY

THE PATENT SCAFFOLDING CO., Inc.®

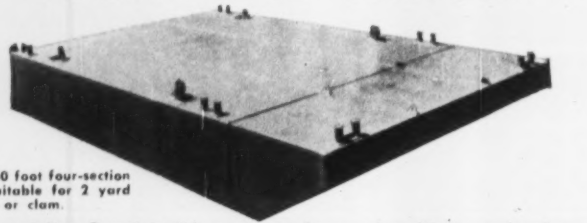
Shovel and Crane Operators —
If you want Longer Life and Lower Cost
From Track Pad Pins... Insist
on ATLANTIC'S New Heat-Treated
ATLOY STEEL!

ATLANTIC'S new heat-treated *Atloy Steel for Track Pad Pins* is equally tough and wear resisting from outer surface to center. Atloy Pins provide a much longer life, greatly increased shock resistance and remarkable abrasion resistance. In addition, Atloy Pin Steel is metallurgically heat treated to avoid undue wear on Track Pads. Consequently, *length of service* is greatly *increased. Maintenance costs* are materially *decreased.*

Order *your* Atloy Steel in bar form or cut to exact Pin length. Write for Atloy Booklet No. 283.

ATLANTIC STEEL CORP.
Since 1918 . . . Always First with the Finest!
1775 Broadway, New York 19

MANITOWOC
SECTIONAL BARGES

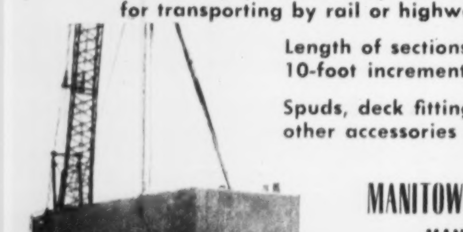


A 50 x 30 foot four-section barge suitable for 2 yard dragline or clam.

● For floating lift cranes, clams, draglines and other contrators' equipment. Easily assembled or knocked down for transporting by rail or highway.

Length of sections from 20 to 50 feet in 10-foot increments.

Spuds, deck fittings, loading ramps and other accessories available.



Loading a 40-foot section for highway transportation.

MANITOWOC SHIPBUILDING, INC.
MANITOWOC, WISCONSIN

Write for information and prices.

Sold direct or through Manitowoc Engineering Corp. distributors.

Ohio Highway Job

Continued from preceding page

land, Ohio. Albert S. Porter is chief engineer.

The $2,594,956 contract to The Horvitz Co., Cleveland, O., is 2.7% below the second and 9.15% below the high third bid.

Work includes grading, paving of the 26-ft roadway, construction of three reinforced concrete and structural steel bridges, grade eliminations and the relocation of Cuyahoga River. The bridges will carry the road over an existing highway, the Baltimore and Ohio Railroad and the relocated Cuyahoga River.

Contract specifications call for 50,000 sq yd of 9-in. reinforced concrete pavement which drew bids from $6.50 to $6.90 per sq yd. Contractor prices for 547,000 lb of reinforcing steel are $0.13 and $0.14 in different structures, for 1 million lb of structural steel prices are $0.22 per lb including field painting. Unpainted steel in expansion joints ranges from $0.28 to $0.33 per lb for 39,000 lb.

Class C concrete will go into superstructures, pier caps and columns and into abutments and walls. Contract prices range from $53 to $89 per cu yd in different structures. Class E concrete is priced $40 and $47 per cu yd in pier footings and $60 per cu yd in unclassified structures.

Approximately 46,000 lin ft of 14-in. reinforced concrete piles are priced $6.00 to $7.75 per lin ft by the contractor.

Bid prices also include air compressor hours, $6.30; truck hours, $5.60 and labor hours which range from $3.35 for unskilled to $4.30 to skilled labor. These compare with straight hourly wage rates prevailing in Cuyahoga County that include $1.90 for flagmen and watchmen, $2.75 for cement handlers and concrete smoothers, $2.875 for concrete puddlers and form setters, $2.50 to $3.00 for truck drivers, $3.50 for reinforcing placers, $3.40 for pile drivers and bridge and structural steel painters, $3.325 to $3.575 for equipment operators and $3.375 for pipe fitters.

The three bidders on the Cuyahoga County project are:

1C	Horvitz Co., Cleveland, Ohio	$2,594,956
2	Lombardo Bros. Constr. Co., Cleveland, O	2,666,320
3	American Constr. Co., Cleveland, O	2,827,434
EE	Albert S. Porter, Cuyahoga County Engr, Cleveland, O	2,856,300

Excavation roadway	cy	325,000	$0.92	$1.00
Borrow filling channel	cy	259,000	0.92	1.10
	cy	56,000	0.92	1.00
Rigid pave, remov & disp	sy	11,000	1.00	1.00
Sidewalk remov & disp	sf	450	0.06	0.10
Stone curb, remov & disp	lf	3,850	0.25	0.30
Pipe, 10-18", remov	lf	600	1.25	1.50
RCCP, storm sewer, 12"	lf	6,600	4.00	4.80

Ohio Highway

Continued from preceding page

Bids: 9-24-56 Items	Unit	Quantity	Unit Prices 1C	 2
RCCP, storm sewer				
15″	lf	1,225	5.00	5.25
18″	lf	510	6.50	7.00
21″	lf	1,475	7.00	8.25
24″	lf	725	8.50	10.50
CMP, bit pav, 12″	lf	240	4.25	5.65
15″	lf	300	5.00	6.25
30″	lf	89	11.00	18.00
RCCP, storm sewer, 12″	lf	115	4.40	4.50
18″	lf	190	6.50	7.85
30″	lf	1,350	13.00	17.00
36″	lf	435	19.00	25.00
CMP, for driveways, 12″	lf	28	3.50	3.50
15″	lf	35	4.00	4.00
bit pav, 15″	ea	1	18.75	18.75
RCCP, bend 15″ 85°	ea	1	21.00	21.00
reducer-bend, 18″ to 15″ 20°	ea	1	25.00	25.00
Monument box, adj to gr	ea	1	25.00	25.00
furn & set	ea	33	45.00	50.00
MH, std. #3-C mod	ea	50	285.00	285.00
CB, std. #3-C	ea	4	250.00	250.00
#1-3 mod	ea	3	275.00	325.00
#1-3	ea	22	225.00	260.00
#3-C	ea	80	265.00	265.00
MH, std #2 without drop	ea	2	1,000	1,200
#9 & 28 rebuild	ea	1	200.00	200.00
Spec geod mon box	ea	1	175.00	175.00
VSP underdrain outlets 6″	lf	180	2.00	2.50
underdrains 6″	lf	22,000	1.50	1.50
Riprap, type "A"	sy	1,800	10.00	10.00
Rockfill, dumped	cy	35	6.00	6.00
Spec. struct SDS #26	ea	5	60.00	100.00
Gutter, type 2, std pav	lf	1,150	3.25	3.25
type 3	lf	100	4.50	4.50
Gd rail, steel beam type	lf	15,000	3.00	2.50
remov & reused	lf	210	2.00	2.00
VSP, storm sewer 6″	lf	200	2.00	2.50
Subgr, compacted	sy	55,600	0.05	0.08
Tee, VSP, 6″x6″	ea	5	5.00	5.00
MH, abandoned	ea	10	25.00	25.00
CB, abandoned	ea	12	20.00	20.00
Seeding & protecting	sy	179,000	0.07	0.20
Fertilizer, commercial	t	16	80.00	110.00
Limestone, Gr, agricultural	t	81	25.00	40.00
Pav, reinf. conc 9″	sy	49,800	6.90	6.50
Surf, asph conc 2½″	sy	600	1.50	1.50
Pav conc 6″	sy	80	6.10	6.10
Bit, tack coat	gal	56	0.30	0.30
prime coat	gal	14	0.30	0.30
Sand	t	1.5	5.00	5.00
Conc, drives, remov & disp.	sy	50	1.50	1.50
Agg base, cr 10″	cy	11	11.00	11.00
Curb, integral conc 6x7″	lf	1,200	1.00	1.00
Curb & gutter, integral conc 2′6″	lf	20,900	3.30	2.50
Sidewalks, conc 4½″	sf	630	0.60	0.60
Agg, cr, stab, should, etc, 3″	cy	300	10.00	10.00
6″	cy	430	9.50	9.50
Side approaches, 6″	sy	1,050	1.70	1.70
Insul, crse, 3″	sy	14,800	1.00	1.00
Subbase 12″	cy	19,000	3.75	4.00
Conc, for struct "C"	cy	17	70.00	70.00
"E"	cy	50	60.00	60.00
Steel, reinf	lf	340	0.15	0.15
Flap gates for 24″ pipe	ea	2	150.00	175.00
30″ pipe	ea	2	220.00	250.00
Pipe culv roadway 12″	lf	76	4.00	4.00
18″	lf	184	6.00	6.00
42″	lf	104	19.00	21.00
42″	lf	188	23.00	24.00
72″	lf	180	52.00	65.00
Pipe, culv-bit, rw 12″	lf	60	7.50	8.00
30″	lf	72	9.00	11.00
Diaphram, bit, ctd CM	ea	2	500.00	550.00
Excav, for struct	cy	1,150	3.00	4.00
channel	cy	83,000	0.92	0.80
Valve boxes, reset	ea	4	25.00	25.00
Old hydrant T, plug	ea	1	350.00	350.00
Hydr & hydr branch, reset	ea	1	1,100	1,200
Cofferdams, cribs & sheet	ls	job	5,000	6,000
Excav for struct	cy	550	5.00	5.00
Conc, cl C, superstruct	cy	230	72.00	72.00
piers, caps & columns	cy	145	75.00	85.00
abutmts & walls	cy	200	53.00	60.00
Sidewk, conc, cl C, reinf	sf	1,900	0.65	0.75
Conc, cl E, pier ftgs	cy	95	40.00	45.00
Waterproof, type A, sidewk & bridge	sy	220	1.00	2.00
Waterproof type A	sy	160	2.00	3.00
type B	sy	20	5.50	5.50
type C	sy	730	0.30	0.90
Sealing strip, preformed	lf	100	3.00	5.50
Steel, reinf	lb	111,000	0.13	0.14
struct, incl field paint	lb	277,000	0.22	0.22
struct, expans joints	lb	8,400	0.28	0.28
Bridge railing, steel	lf	471	20.00	21.00
Test pile, first	ls	job	800.00	800.00
first, loaded	ls	job	1,000	1,000
subseqnt loaded	ea	1	800.00	800.00
Piles, reinf conc, dig	lf	6,900	6.00	6.50
Name plates	ea	2	150.00	200.00
Subdrain wear crse	lf	480	1.30	1.30
Deck drain sys	ls	job	3,000	3,100
Pour joints, sidewalks	lf	1,300	0.10	0.16
Approach slab, reinf conc,				
11½″	sy	65	16.50	16.50
13″	sy	85	18.00	18.00

Continued on following page

Form pins are driven swiftly and cheaply with air from a Standard Pneumatractor, self-propelled right to the job.

A CONSTRUCTION SUPERINTENDENT REPORTS:

"I'd never buy another 125 c.f.m. compressor that wasn't a Pneumatractor"

Putting compressed air to work on the job has never been easier or more economical. The operator merely climbs into the seat of his Schramm Standard Pneumatractor and drives a complete air compressing plant right up to the job. No other equipment or labor is involved.

On arrival, this rugged 125 c.f.m. air compressor with tractor features can push, pull, provide mechanical power and compressed air for operating a variety of auxiliary equipment.

The cost of the Standard Pneumatractor is low; less than many two wheel mounted compressors alone. It's cheaper to operate and maintain, too. Any engine service man can service the Pneumatractor with very little instruction.

Ask your local Schramm dealer for a demonstration of the Standard Pneumatractor. He's listed in the Yellow Pages of your Telephone Directory.

Write for Catalog 5545 and free informative booklet, "Piston vs. Rotary Air Compressors."

Schramm, Inc.

MANUFACTURERS OF AIR COMPRESSORS

610 North Garfield Ave. **West Chester, Pa.**

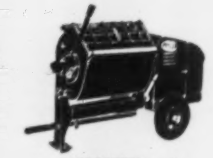
The one-yard bucket on this Schramm Heavy Pneumatractor can handle up to 4000 pounds. With bucket and backhoe, you get a unit that replaces many individual machines on the job.

Pneumajack, mounted on a Standard Pneumatractor, does a variety of jobs from drilling for mud jacking to production drilling.

MULLER MACHINES
combine
high quality with
low price

Customers often express surprise that Muller Mixers and Power Trowels of such excellent quality can be sold for such low prices. There are four reasons: (1) long experience (46 years), (2) specialization, (3) best materials, (4) best distributors.

MULLER MIXER



PLASTER and MORTAR MIXERS

Five sizes, 2 to 10 cu. ft. Electric or gasoline. Muller Lifetime Paddle Shaft Seal. Power throwouts on smaller models, disc clutch on larger. Rubber scraper blades optional.

CONCRETE MIXERS

Three models, 3 to 6 cu. ft., tilting type. Ample drums, fast mixing action. Timken Bearings, electrically welded construction. Electric or gasoline.

4 BLADED POWER TROWELS—Sizes 24", 29", 34" and 44" dia., B & S Engines. Stationary guide ring. Clutch and speed controls on handle.

Ask for prices and name of local dealer. You will be agreeably surprised with Muller's low prices.

MULLER MACHINERY COMPANY, Inc.
Metuchen 21, N.J. Cable Address MULMIX

Onan Model 5DRP mounted on trailer with extension lighting standard.

Cut lighting costs with

Onan portable air-cooled Diesel Electric Plants

Make substantial savings on any job where extensive night-lighting is necessary by using Onan Diesel-driven electric plants. Diesel fuel has a big edge in economy and it's readily available on job sites. Onan Diesel plants are built for rugged service, with extra-large bearing surfaces, Stellite exhaust valve seats and other long life features. Engine and generator are direct-connected . . . no belts or couplings. Air-cooling eliminates trouble from freezing or leaking coolants. Compact and light weight. Put an Onan Diesel Plant on your next job and check the savings.

Diesel Plants—3,000 and 5,000 watts.
Gasoline Plants—500 to 50,000 watts.

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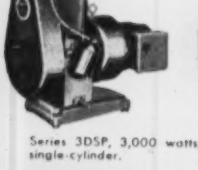
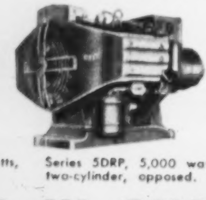


Series 3DSP, 3,000 watts, single-cylinder.



Series 5DRP, 5,000 watts, two-cylinder, opposed.

Onan ELECTRIC PLANTS

D. W. ONAN & SONS INC.
2996 University Ave. S.E., Minneapolis 14, Minnesota

Ohio Highway

Continued from preceding page

Bids: 9-24-56			Unit Prices	
Items	Unit	Quantity	1C	2
Asph conc surf, 2½"	sy	870	1.50	2.25
Equip for soil load bearing tests	ls	job	1,000	1,000
Soil load bearing tests	ea	3	600.00	600.00
Excav for struct	cy	500	4.50	5.00
Conc, cl C	cy	180	72.00	72.00
pier caps & columns	cy	100	85.00	85.00
abutment & walls	cy	180	60.00	60.00
Bri sidewk wear, crse, conc reinf, 3"	sf	1,500	0.65	0.75
Conc, cl E pier ftgs	cy	60	40.00	45.00
Waterproofing, bridge sidewalk, A	sy	180	1.00	2.00
Waterproofing, A	sy	150	2.00	3.00
B	sy	20	5.50	5.50
C	sy	560	0.30	0.90
Sealing strip, preformed	lf	100	3.00	5.50
Steel, reinf	lb	85,000	0.13	0.14
struct, field paint	lb	214,000	0.22	0.22
struct, expans jts	lb	8,400	0.28	0.28
Bridge railing, stl	lf	380	21.00	21.00
Test pile, first	ls	job	800.00	800.00
first load	ls	job	1,000	1,000
subsequent load	ea	1	800.00	800.00
Piles, conc, reinf, dig 14"	lf	6,000	6.00	6.50
Soil load bearing tests	ea	2	600.00	600.00
Name plates	ea	2	150.00	200.00
Subdrain, wear crse	lf	370	1.30	1.30
Deck drain syst	ls	job	4,100	4,100
Poured jts in sidewalk	lf	1,000	0.10	0.16
Appr slab, reinf conc, T-13"	sy	160	18.00	18.00
Surf, asph conc, 2½"	sy	720	1.50	2.25
Cofferdams, cribs & sheet	ls	job	37,800	36,000
Excav for struct	cy	1,850	5.25	5.00
Conc, cl C, superstruct	cy	650	75.00	72.00
pier caps & columns	cy	390	89.00	85.00
abutments & walls	cy	320	80.00	77.00
Sidewk, reinf conc, cl C, 3"	sf	5,200	0.75	0.75
Conc cl E ftgs & abut ftgs	cy	350	47.00	45.00
Waterproofing bridge, sidewalk, A	sy	580	2.00	2.00
Waterproofing, A	sy	600	3.00	3.00
B	sy	5	5.50	5.50
C	sy	2,000	0.30	0.90
Sealing strip preformed	lf	20	5.50	5.50
Steel, reinf	lb	298,000	0.147	0.14
struct field painting	lb	842,000	0.22	0.22
struct expans jts	lb	22,200	0.33	0.33
Bridge railings, steel	lf	1,260	21.25	21.00
First test pile	ls	job	800.00	800.00
load	ls	job	1,000	1,000
Subseq pile test load	ea	1	800.00	800.00
Piles, reinf conc, dig 14"	lf	22,400	7.75	6.50
Name plates	ea	2	200.00	200.00
Subdrain wear crse	lf	1,300	1.30	1.30
Deck drain sys	ls	job	2,400	2,400
Backfill, porous	cy	70	8.00	8.00
Sidewalk, poured jts	lf	3,400	0.16	0.16
Appr slab, reinf conc T-10"	sy	50	15.00	15.00
T-13"	sy	90	18.00	18.00
Surf asph conc, 2½"	sy	2,100	1.50	2.25
Cofferdams, cribs & sheet	ls	job	300.00	300.00
Excav for struct	cy	650	5.00	5.00
Conc, cl C, counter forts & walls	cy	295	80.00	80.00
cl E ftgs	cy	325	40.00	45.00
Sealing strip, premolded	lf	210	3.00	5.50
Waterproofing, A	sy	550	2.00	3.00
Steel, reinf	lb	39,600	0.13	0.14
Expans jt filler pref grey rubber, 1"	sf	80	2.00	2.00
cork, 1"	sf	65	1.00	1.00
First test pile	ea	3	800.00	800.00
load	ea	3	1,000	1,000
Subseq test pile load	ea	3	800.00	800.00
Piles, reinf conc, dig 14"	lf	10,600	6.00	6.50
Porous bkfl, N&S walls	cy	120	8.00	8.00
ramp D wall	cy	110	7.00	7.00
CMP, bit, pref, 6"	lf	580	2.50	2.50
coated, 6"	lf	30	3.30	3.30
12"	lf	14	7.00	7.00
Gutter, conc H.R. 12"	lf	570	3.00	3.00
Cofferdams, cribs & sheetg	ls	job	400.00	400.00
Excav for struct	cy	20	3.00	6.00
CMP, bit, pref, 6"	lf	240	2.00	2.50
coated, 6"	lf	24	3.00	3.00
Gutter, conc, H.R. 12"	lf	250	3.00	3.00
Ret walls, galv mtl cellular	sf	1,250	5.50	5.50
Excav, roadway	cy	20	2.00	2.00
for struct	cy	50	5.00	5.00
Borrow	cy	350	1.00	1.35
Conc, cl E abuts, E	cy	22	60.00	60.00
cl C, slab & pier cap	cy	34	75.00	75.00
Waterproofing, A	sy	25	3.00	3.00
Sealing strip, preformed	lf	40	3.00	5.50
Steel, reinf	lb	13,000	0.13	0.14
Bri railing, stl	lf	120	5.00	5.00
First test pile	ls	job	800.00	800.00
Piles, reinf conc, dig 14"	lf	270	7.50	7.50
CMP, bit, pav, 12"	lf	32	3.50	3.50
Base crse, cr agg	cy	45	11.00	11.00
Crane	hr	10	20.00	20.00
Air compressor	hr	30	6.30	6.30
Truck	hr	40	5.60	5.60
Labor, skilled	hr	40	4.30	4.30
Intermed, gr	hr	60	3.60	3.60
unskilled	hr	120	3.35	3.35
Barricades, danger signs	ls	job	1,500	1,548

Work started: 10-8-56 To be completed: 9-15-58

SONOTUBE® FIBRE FORMS

SONOCO

CLIFT
CLIFT
SELF PARKING
PARKING

for round columns of concrete

San Francisco Parking Garage, San Francisco, Calif. Cahill Construction Co., Contractors. George A. Applegarth, Architects. Ellison and King, Consulting Engineers.

Save Time, Labor and Money!

Use SONOTUBES for:

- Industrial Buildings
- Elevated Highways
- Railroad Structures
- Office Buildings
- Apartment Buildings
- Sports Arenas
- Retail Stores
- Residences
- Colleges
- Schools
- Churches
- Hospitals
- Hotels
- Banks
- Warehouses
- Bridges
- Restaurants
- Special Applications

SONOTUBES are widely used by contractors, approved by architects and engineers everywhere

SONOCO SERVES THE WORLD PAPER CARRIERS REG. U.S. PAT. OFF.

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FIBRE FORMS

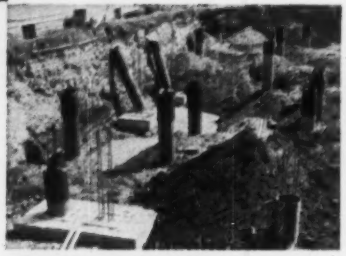
For a fast, economical Round COLUMNS use *LOW COST*

SONOTUBE Fibre Forms were specifically developed to provide a fast, economical method of forming round columns of concrete.

SONOTUBE Fibre Forms are approved by architects and engineers and are widely used by contractors everywhere.

For use in a variety of structures, low-cost **SONOTUBES** form underpinning, stub columns and quarter, half and obround columns. Economical encasement of columns, piers and piles has been proven on many jobs. And with **SONOTUBES,** beam tie-in and wall tie-in is easy.

The functional versatility of **SONOTUBE** Fibre Forms allows ready application to many types of concrete columns to fit special requirements and serve special purposes.



UNDERPINNING—Set SONOTUBE in place, backfill, then pour. Also use SONOTUBES for exposed supporting columns.

OBROUND COLUMNS—Cut SONOTUBE as desired. Fasten to other form work. Use template to hold in place.

STUB COLUMNS and FOOTINGS—SONOTUBES can be used economically and easily above or below ground surface.

Sonotube
Sonotube
Sonotube

UTILITY OUTLETS—Easily formed where desired on columns erected with SONOTUBES.

TECHNIC

ERECTION

PLACING

SONOTUBES are lightweight, easily handled and require few men to put in place manually or with simple block and tackle. Saw to size on the job or order specific lengths.

BRACING

Minimum bracing is required. SONOTUBES are rigid, round fibre forms and need only the simplest bracing of light timber, quickly constructed, to keep them erect.

POURING

Steel reinforcing, spiral or straight, can be used inside the SONOTUBE. Hopper, chute or wheelbarrow-poured concrete can be vibrated extensively without the slightest damage to SONOTUBE Fibre Forms.

STRIPPING

SONOTUBE forms strip easiest and most economically from two to ten days after pouring. Suggested method is by portable electric saw set to depth of wall thickness of SONOTUBE. Make two to three vertical cuts, evenly spaced, and pull form free.

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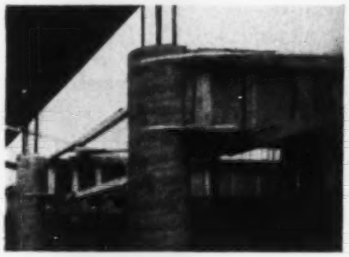
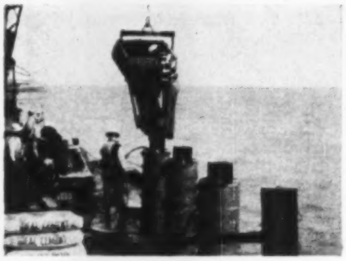
method of forming of CONCRETE... *SONOTUBES!*

SONOTUBE SONOCO FIBRE FORMS



BEAM TIE-IN—Saw out section and fasten "slotted" SONOTUBE to beam form with strapping.

WALL TIE-IN—SONOTUBES can be drilled, sawed or cut to tie-in brick, frame or masonry walls to the columns.



PILE or PIER ENCASEMENT—Use special SONOTUBE for under and above water. Variety of methods.

ENCASEMENT—Use Dry-Ply SONOTUBE to encase steel or wooden columns and upright pipes.

AL DATA

STRENGTH TESTS

Bursting pressure from inside out for 16" I.D. "A-coated" SONOTUBE is 122 2/3 lbs./sq. in. Details and data for other diameters on request.

Compression tests to determine average pressure causing rupture in 5' long, 16" I.D. "A-coated" SONOTUBE showed 6575 lbs. or 428 lbs./sq. in. Area of tube under compression was 15.362424 sq. inches.

Crushing strength test, 3 edge bearing A.S.T.M.—designation C13-24—for 16" I.D. "A-coated" SONOTUBE is 157 lbs./lin. ft. Details and data for other diameters on request.

HOW TO SPECIFY, ORDER AND STORE

Sonoco's patented "A-coated" SONOTUBES are for finished columns and are available in regular wall and light wall (for columns 10' and under) thicknesses.

Sonoco's "Action-Wall" SONOTUBES are specifically designed to assist in curing, to provide uniform surface and facilitate stripping.

"W-coated" SONOTUBES, regular and light wall, are for use when stripping is not required or finished surface not desired. "Seamless" SONOTUBES are also available.

All SONOTUBES can be supplied in lengths to 48'. Order from your distributor or write for name of distributor nearest you.

SONOTUBE is a ruggedly constructed fibre product. It can be stored in the open on the job with minimum protection and support. Minimum protection should consist of a tarpaulin which will cover ends of SONOTUBES at all times. Supports should run the entire length and be elevated a minimum of 4' from the ground.

SIZES and WEIGHTS

REGULAR

(STANDARD LENGTH 18')

Inside Diameter	Wall Thickness	Approx. Wt. Per M ft.	Approx. No. ft. in Carload
2"	.125	276 lbs.	84,672 ft.
3"	.150	481 lbs.	39,204 ft.
4"	.175	735 lbs.	22,500 ft.
5"	.175	910 lbs.	15,120 ft.
6"	.200	1,268 lbs.	10,300 ft.
7"	.200	1,428 lbs.	8,000 ft.
8"	.200	1,623 lbs.	6,500 ft.
9"	.200	1,877 lbs.	5,000 ft.
10"	.225	2,266 lbs.	4,400 ft.
11¼"	.225	2,543 lbs.	3,400 ft.
12"	.225	2,709 lbs.	3,000 ft.
13½"	.225	3,041 lbs.	2,500 ft.
14"	.250	3,484 lbs.	2,160 ft.
15"	.300	4,440 lbs.	1,728 ft.
16"	.300	4,731 lbs.	1,512 ft.
18"	.300	5,311 lbs.	1,080 ft.
20"	.375	7,313 lbs.	1,080 ft.
21"	.375	7,672 lbs.	972 ft.
22"	.375	7,994 lbs.	720 ft.
24"	.375	8,749 lbs.	684 ft.
26"	.375	9,466 lbs.	576 ft.
28"	.375	10,185 lbs.	576 ft.
30"	.400	11,607 lbs.	432 ft.
32"	.400	12,371 lbs.	324 ft.
34"	.400	13,164 lbs.	288 ft.
36"	.400	14,235 lbs.	288 ft.
38"	.450	16,792 lbs.	270 ft.
40"	.450	17,665 lbs.	198 ft.
42"	.450	18,538 lbs.	162 ft.
44"	.475	20,451 lbs.	162 ft.
46"	.475	21,370 lbs.	144 ft.
48"	.500	23,403 lbs.	144 ft.

LIGHT WALL

(STANDARD LENGTH 10')

6"	.125	793 lbs.	11,330 ft.
7"	.125	923 lbs.	8,000 ft.
8"	.125	1,051 lbs.	7,150 ft.
9"	.125	1,395 lbs.	5,000 ft.
10"	.150	1,546 lbs.	4,840 ft.
11¼"	.150	1,736 lbs.	3,400 ft.
12"	.150	1,850 lbs.	3,300 ft.
13½"	.175	2,396 lbs.	2,500 ft.
14"	.175	2,483 lbs.	2,376 ft.
16"	.175	2,834 lbs.	1,663 ft.
18"	.200	3,605 lbs.	1,108 ft.
20"	.200	4,001 lbs.	1,108 ft.
22"	.225	4,910 lbs.	792 ft.
24"	.225	5,354 lbs.	752 ft.
26"	.300	7,619 lbs.	576 ft.
28"	.300	8,197 lbs.	576 ft.
30"	.300	8,769 lbs.	432 ft.
32"	.300	9,357 lbs.	324 ft.
34"	.300	9,933 lbs.	288 ft.
36"	.300	10,516 lbs.	288 ft.

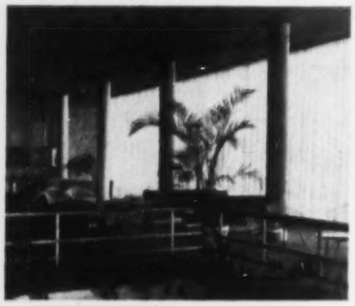
SONOTUBE FIBRE FORMS

SONOCO

For cost-cutting formwork in bridges and buildings . . . use SONOTUBES!

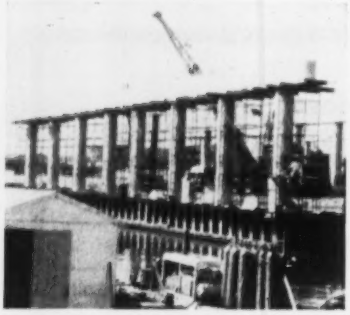
Louisiana State University Stadium
Baton Rouge, La.
Farnsworth and Chambers
Contractors and Engineers

LaBonheur Children's Hospital
Memphis, Tenn.
Harmon Construction Co., Contractors
J. Frazier Smith & Assoc., Architects
Photo by Joseph W. Molitor



Charlotte Municipal Auditorium
Charlotte, N. C.
Thompson and Street, Contractors
A. G. Odell, Jr. & Associates, Architects

Highway Bridge, Superior, Arizona, Arizona State Hwy. Dept., Geo. E. Long, State Highway Engineer, Bentson Construction Co., Phoenix, Contractors, S. W. Henderson, Job Superintendent.



Providence River Bridge, North-South Freeway, Providence, R. I. Rhode Island Department of Public Works, Div. of Roads & Bridges. M. A. Gammino Company, Contractors. Charles A. Maguire & Associates, Boston, Consulting Engineers. Photo: Courtesy New England Construction.

Highway Bridge in Topeka, Kansas. Designed by Bridge Dept., Kansas State Hwy. Comm. J. W. Frisbee, Kansas City, Mo., Contractor.

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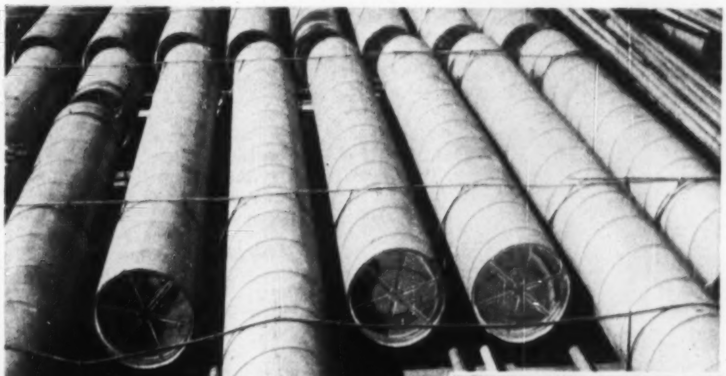
For voids in concrete construction
...use SONOVOIDS!®

SONOVOID® FIBRE TUBES

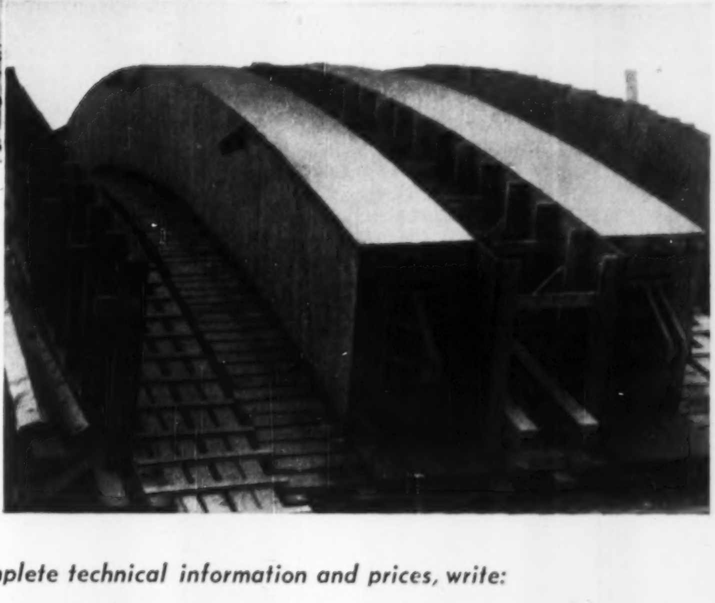
SONOVOID Fibre Tubes are specifically developed to form voids in bridge decks, wall, floor, roof and lift slabs and in concrete piles.

There are many special applications for which the use of SONOVOIDS is indicated. SONOVOIDS can be used to carry utility services such as electrical conduits, gas and water mains through the deck of elevated structures; they can be used as ducts for wiring and piping in building construction, etc.

Use low-cost SONOVOIDS in precast units or cast in place construction. Economical SONOVOIDS save concrete and reinforcing steel and save weight . . . by displacing low-working concrete at the neutral axis. Structural strength is not impaired.



SONOVOIDS®
Save Concrete
and
Reinforcing Steel!



USE SONOVOIDS®
in bridges,
buildings and
hollow piles!

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SONOVOID® SONOCO FIBRE TUBES

Save concrete and reinforcing steel . . . *use SONOVOIDS!*®

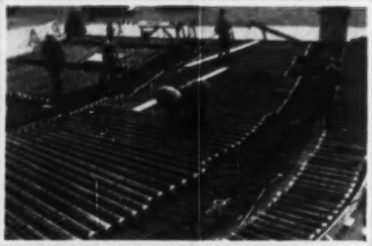
SONOVOID SIZES

Outside Diameters	Wall Thickness	Spindle Sizes or Inside Diameter
* 2.25″	.125″	2.030″
2.50″	.125″	2.248″
* 3.00″	.125″	2.758″
3.50″	.125″	3.245″
* 4.00″	.125″	3.750″
4.50″	.125″	4.250″
* 5.00″	.150″	4.714″
* 6.00″	.175″	5.640″
7.00″	.200″	6.530″
* 8.00″	.200″	7.530″
* 9.00″	.200″	8.534″
10.00″	.225″	9.550″
11.00″	.225″	10.500″
12.00″	.225″	11.600″
14.00″	.250″	13.594″
15.70″	.300″	15.100″
16.70″	.300″	16.100″
18.70″	.300″	18.100″
20.85″	.350″	20.100″
22.85″	.375″	22.100″
24.85″	.375″	24.100″
26.85″	.375″	26.100″
28.85″	.375″	28.100″
30.90″	.400″	30.100″
36.90″	.400″	36.100″

*Metal End Closures available for sizes indicated by asterisks. Metal and Fibre Combination End Closures available for sizes from 10″ O.D. & up.

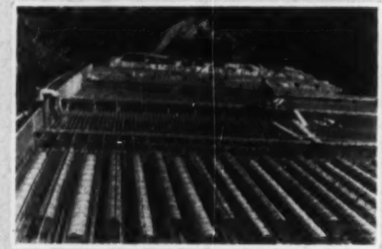
FLOOR and ROOF SLABS

This floor slab for an office building in Los Angeles, Calif. will contain hollows formed by 24.85″ SONOVOID Fibre Tubes. The tubes are shown being tied down in place prior to the pouring of concrete.



CANOPY and LIFT SLABS

The canopy slab being constructed for the Coliseum Music Hall canopy in Houston, Tex. contains 6″ O.D. SONOVOIDS. For canopy or lift slabs SONOVOIDS meet the requirements for long span, lightweight, thin slabs having a smooth ceiling and low upkeep cost.

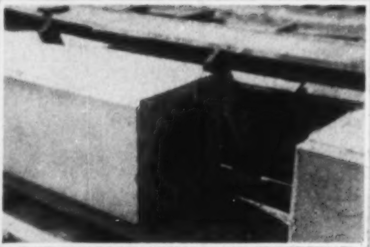


BRIDGE DECK (in place)

The arch-spandrel Dog Creek Bridge near Redding, Calif. included 16″ O.D. SONOVOIDS in the approach span. 12″ O.D. SONOVOIDS were used in the spandrel columns on the upgrade side to equalize the load on the arch.

BRIDGE DECK (Precast)

The Corning Canal Bridges near Redding, Calif. consist of 84 separate structures of the two-span type averaging 50′ in length. Three 8″ O.D. SONOVOIDS were used in each precast deck slab. Slabs are designed for H-20 loading.



HOLLOW PILES

SONOVOIDS have been used to construct hollow piles for bridges and piers in many localities. Shown is an end view of a pile for the Eureka Slough bridge, Eureka, Calif. The square 20″ x 20″ piles for this bridge contain 12″ O.D. SONOVOIDS. Each pile is prestressed and contains 18 ⅜″ wire cables. The 139 piles vary in length from 45′ to 105′.

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with these
SONOCO PRODUCTS

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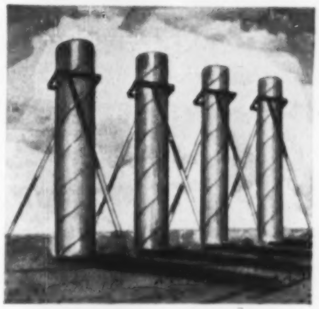
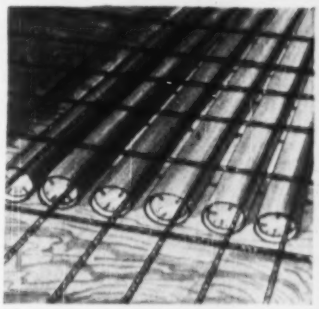
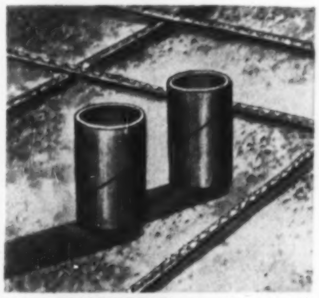
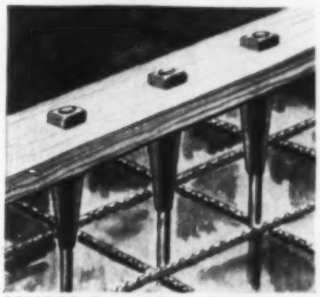
Construction Products

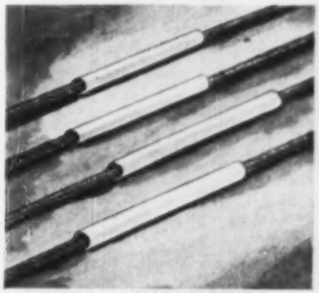
Sonoco's Construction Products are precision-manufactured to meet the exacting requirements and specifications of the industry. These low-cost fibre products were developed to assist contractors reduce cost of construction, speed up construction time and save materials. All Sonoco products are approved by architects and engineers and are being widely used by contractors everywhere. Write for complete technical data and prices.

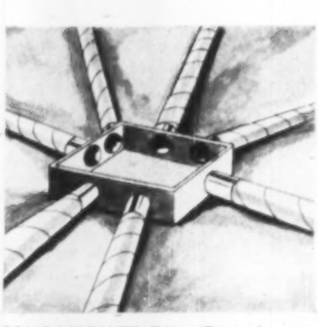

SONOTUBE Fibre Forms for round columns of concrete.

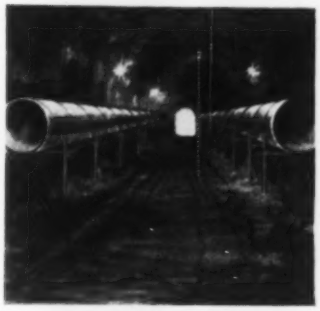

SONOVOID Fibre Tubes for voids in concrete construction.


Fibre **SONOPIPE** Sleeves to provide openings thru concrete slab floors for utility services.


SONOCO Conical Fibre Protectors for use in place of welded pipe sleeves when pouring around anchor bolts.


SONOCO Fibre **VARI-SLEEVE** for use with dowel & reinforcing bars, prestressed concrete strands and in creating holes for bolts and tension bars in precast concrete members.


SONOAIRDUCT Fibre Duct for use in concrete slab floor perimeter heating systems.


SONOCO Fibre **TUBES** for use in tunnel ventilation.

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Shreveport, La.

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Camden, Maine

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Lansing, Mich.

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Route 38
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Igoe Bros., Inc.
Avenue A & Poiner Street
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Igoe Bros., Inc.
258 Belvidere Avenue
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Kilpatrick Brothers
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Oklahoma City, Okla.

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2344 N.W. 21st Avenue
Portland, Ore.

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E. McKeesport, Pa.

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276 E. Bay Street
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Seaber & Aiken
P. O. Box 5271
1105 Marlboro Street
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Chapin Company
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Gage Brothers Concrete Products Co.
West on Highway 16
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Wilson-Weesner-Wilkinson Company
202 W. Morelia Avenue
Knoxville, Tenn.

Fischer Lime & Cement Co.
269 Walnut Street
Memphis, Tenn.

Wilson-Weesner-Wilkinson Co.
310 S. Second Street
Nashville, Tenn.

TEXAS

West Texas Builders Supply Co.
315 Plum Street
P. O. Box 1045
Abilene, Texas

Builders Specialty Co. of Austin
5215 E. First Street
Austin 31, Texas

South Texas Materials Co.
Oso at Powers Street
P. O. Box 778
Corpus Christi, Texas

Blue Diamond Company
2722 Logan Street
Dallas 15, Texas

Peterson Lumber Company
1630 Texas Street
El Paso, Texas

Cain's Builders Supply Co.
1933 W. Vickery Boulevard
Fort Worth, Texas

Black-Brollier, Inc.
3010 Dixie Drive
Houston 4, Texas

Builders Supply Co.
Longview, Texas

Duo Distributors, Inc.
7th Street & K Avenue
Lubbock, Texas

West Texas Builders Supply Co.
3100 W. N. Front Street
Midland, Texas

Rufus A. Walker Company
401 Delgado Street
P. O. Box 8082
San Antonio 12, Texas

UTAH

Intermountain Concrete Specs.
329 Pierpont Avenue
Salt Lake City 1, Utah

VERMONT

Mr. Henry M. Tuttle
113 Depot Street
Bennington, Vermont

VIRGINIA

Batchelder & Collins, Inc.
Granby St. and N & W R.R.
Norfolk, Va.

McIlhany Equipment Co., Inc.
P. O. Box 8505
2104 N. Hamilton Avenue
Richmond, Va.

McIlhany Equipment Co., Inc.
P. O. Box 121
Corner 14th St. &
Center Avenue, N.W.
Roanoke 2, Va.

WASHINGTON

W. J. Burke & Co.
1101 Elliott Avenue, West
Seattle 99, Wash.

WEST VIRGINIA

Ira F. Kuhn Company
P. O. Box 5176
1724 Washington Street, East
Charleston 1, W. Va.

WISCONSIN

Boehck Equipment Co.
2404 W. Clybourn Avenue
Milwaukee 3, Wisconsin

SONOCO PRODUCTS COMPANY

CONSTRUCTION PRODUCTS DIVISION

LOS ANGELES, CAL.
5955 SOUTH WESTERN AVE.

HARTSVILLE, S. C.

MONTCLAIR, N. J.
14 SOUTH PARK STREET

AKRON, IND.
LONGVIEW, TEXAS
BRANTFORD, ONT.
MEXICO, D. F.

How to Compute Lighting System Costs

Making a cost comparison of different industrial lighting systems can be simplified by adoption of a calculation form proposed by A. C. Barr and C. L. Amick, of the Lamp Division, General Electric Co., Nela Park, Cleveland, Ohio, in a paper, "Fundamentals of Lighting Cost Analysis." (National Technical Conference, Illuminating Engineering Society, 1951.) Tables I and II are based on that form.

These tables present typical 1956 cost data for 22 different lighting systems, classified either as low-mounting or high-mounting types. Prepared by Don Phillips and Dick Woods of GE's Large Lamp Department, they are reprinted here from The Lighting Engineer, Oct., 1956. The assumptions on which the tables are based are indicated in the footnotes.

• Wide scope of application—For specific installations, actual values should be

TABLE 1—COSTS OF LOW-MOUNTED INDUSTRIAL LIGHTING SYSTEMS

LIGHTING SYSTEMS →	I Slimline Instant Start 120-Volt 8-ft. Section 2—96T12 (Series)		II Slimline Instant Start 120-Volt 8-ft. Section 2—96T12 (Lead-lag)		III Slimline Instant Start 277-Volt 8-ft. Section 2—96T12 (Series)		IV High-Output Rapid Start 120-Volt 8-ft. Section 2—96T12 RS		V 40-Watt Preheat Start 120-Volt 8-ft. Section 4—40-Watt T12		VI 40-Watt Rapid Start 120-Volt 8-ft. Section 4—40-Watt T12		VII 90-Watt Preheat Start 120-Volt 10-ft. Section 4—90-Watt T17		VIII *j* 90-Watt Sequence Start 277-Volt 10-ft. Section 4—90-Watt T17	
BASIC DATA																
1. Rated initial lamp lumens per luminaire (standard cool white)	10,100		10,100		10,100		14,600		10,000		10,000		20,600		20,600	
2. Lamp life	7,500		7,500		7,500		7,500		7,500		7,500		7,500		7,500	
3. Average watts per lamp	74		74		74		105		39		39		90		90	
4. Watts per luminaire (includes ballast watts)	178		182		178		250		188		184		422		396	
5. Coefficient of utilization (*a*)	0.74		0.74		0.74		0.73		0.74		0.74		0.72		0.72	
6. Maintenance factor (*b*)	0.79		0.79		0.79		0.75		0.77		0.77		0.77		0.77	
7. Effective maintained lumens per luminaire (Items 1 x 5 x 6)	5,900		5,900		5,900		8,000		5,700		5,700		11,420		11,420	
8. Relative number of luminaires needed for equal maintained ft-c	1.00		1.00		1.00		0.738		1.035		1.035		0.516		0.516	
INITIAL COSTS																
9. Net cost of one luminaire (estimated)	$44.00		$48.40		$45.60		$52.10		$45.50		$45.50		$63.50		$51.00	
10. Installation and distribution system cost per luminaire (estimated)	$34.00		$34.00		$28.50		$40.30		$39.00		$39.00		$64.50		$62.50	
11. Net initial lamp cost per luminaire including tax (estimated) (*c*)	$4.55		$4.55		$4.55		$5.00		$3.00		$3.25		$7.00		$7.00	
12. Total initial cost per luminaire (Items 9 + 10 + 11)	$82.55		$86.95		$78.65		$97.40		$87.50		$87.75		$135.00		$120.50	
13. Annual owning cost per luminaire (15% of items 9 + 10) (*d*)	$11.70		$12.35		$11.10		$13.85		$12.70		$12.70		$19.20		$17.05	
14. Relative initial cost for equal maintained footcandles $\frac{\text{(Items 12 x 8) for system compared}}{\text{Item 12 for base system}}$	1.00		1.05		0.95		0.87		1.10		1.10		0.85		0.75	
ANNUAL OPERATING COSTS																
15. Burning hours per year	2500	4000	2500	4000	2500	4000	2500	4000	2500	4000	2500	4000	2500	4000	2500	4000
16. Annual energy cost . . . 1¢ per kwhr	$4.45	$7.10	$4.55	$7.30	$4.45	$7.10	$6.25	$10.00	$4.70	$7.50	$4.60	$7.35	$10.55	$16.90	$9.90	$15.85
2¢ per kwhr	$9.90	$14.20	$9.10	$14.60	$8.90	$14.20	$12.50	$20.00	$9.40	$15.00	$9.20	$14.70	$21.10	$33.80	$19.80	$31.70
$\frac{\text{(Items 4 x 15 x rate in ¢ per kwhr)}}{\text{100,000}}$																
17. Number of lamps replaced per year $\frac{\text{(Item 15 x no. lamps per unit)}}{\text{Item 2}}$	0.67	1.07	0.67	1.07	0.67	1.07	0.67	1.07	1.33	2.14	1.33	2.14	1.33	2.14	1.33	2.14
18. Lamp cost (Item 17 x net price per lamp including tax)	$1.50	$2.45	$1.50	$2.45	$1.50	$2.45	$1.70	$2.70	$1.00	$1.60	$1.10	$1.75	$2.35	$3.75	$2.35	$3.75
19. Labor cost for lamp replacements (*e*)	$0.65	$1.05	$0.65	$1.05	$0.65	$1.05	$0.65	$1.05	$1.60*i*	$2.55*i*	$1.35	$2.15	$1.60*i*	$2.55*i*	$1.60*i*	$2.55*i*
20. Cost of cleaning twice per year	$1.70	$1.70	$1.70	$1.70	$1.70	$1.70	$1.70	$1.70	$1.70	$1.70	$1.70	$1.70	$2.00	$2.00	$2.00	$2.00
21. Total annual operating cost per luminaire (Items 16 + 18 + 19 + 20) 1¢ per kwhr	$8.30	$12.30	$8.40	$12.50	$8.30	$12.30	$10.30	$15.45	$9.00	$13.35	$8.75	$12.95	$16.50	$25.20	$15.85	$24.15
2¢ per kwhr	$12.75	$19.40	$12.95	$19.80	$12.75	$19.40	$16.55	$25.45	$13.70	$20.85	$13.35	$20.30	$27.05	$42.10	$25.75	$40.00
22. Relative annual operating cost for equal maintained footcandles 1¢ per kwhr	1.00	1.00	1.01	1.02	1.00	1.00	0.92	0.93	1.12	1.12	1.09	1.09	1.03	1.06	0.99	1.01
$\frac{\text{(Items 21 x 8) for system compared}}{\text{Item 21 for base system}}$ **2¢ per kwhr**	1.00	1.00	1.02	1.02	1.00	1.00	0.96	0.97	1.11	1.11	1.08	1.08	1.10	1.12	1.04	1.06
TOTAL ANNUAL COST																
23. Total annual cost per luminaire (Items 13 + 21) . . . 1¢ per kwhr	$20.00	$24.00	$20.75	$24.85	$19.40	$23.40	$24.15	$29.30	$21.70	$26.05	$21.45	$25.65	$35.70	$44.40	$32.90	$41.20
2¢ per kwhr	$24.45	$31.10	$25.30	$32.15	$23.85	$30.50	$30.40	$39.30	$26.40	$33.55	$26.05	$33.00	$46.25	$61.30	$42.80	$57.05
24. Relative total annual cost for equal maintained ft-c. $\frac{\text{(Item 23) x (Item 8) for system compared}}{\text{(Item 23) for base system}}$ **1¢ per kwhr**	1.00	1.00	1.04	1.04	0.97	0.98	0.89	0.90	1.12	1.12	1.11	1.11	0.92	0.95	0.85	0.89
2¢ per kwhr	1.00	1.00	1.03	1.03	0.98	0.98	0.92	0.93	1.12	1.12	1.10	1.10	0.98	1.02	0.90	0.95
VISUAL COMFORT INDEX (*f*) (*g*) (*h*)	78		78		78		71		78		78		75 (estimated)		75 (estimated)	

Luminaires: Open-top, porcelain-enamel industrial reflectors

a **For Room Ratio, 5.0 (A), 70% ceiling, 30% walls. Calculated by Potter-Russell flux-ratio method.**

b **Includes mean lamp depreciation and mean dirt depreciation during life, with two cleanings per year.**

c **Initial lamp cost contributes to total initial cost per luminaire (Item 12), but not to annual owning cost per luminaire (Item 13). The annual cost of lamps is an operating cost, not an owning cost.**

d **Ten-year write-off at 10% per year, plus 5% for interest, insurance, and taxes.**

e **Assumed: $1.20 lamp if starters are required; $1.00 lamp if not.**

Per cent of people who would be expected to appraise the lighting system as comfortable when seated at the middle of the rear wall looking horizontally—crosswise view of lighting fixtures.

g **Initial appraisal for a 50-footcandle installation maintained in a space 120′ x 160′ with luminaires at 14-ft. mounting height.**

h **For additional information see "Visual Comfort Index Data and Tables" by Meaker and Oetting.**

i **Includes cost of starter replacements.**

j **This system is more complex than conventional two-lamp systems; therefore, maintenance is more difficult.**

substituted in each row, to obtain accurate cost comparisons. If this is done, the procedure also may be applied to systems other than industrial.

A cost analysis is useful as a guide in selection of a lighting system. However, it should be emphasized that lighting performance characteristics are the most important factors in making a choice.

• Systems placed on equal footing—The form in which Tables I and II are arranged yields not only the initial and operating costs for each system but also a combination of these as a total annual cost. To assure a fair comparison of different systems, the computation satisfies the following conditions:

- • Equal illumination results. Since different systems may not produce equal illumination levels in service, all costs are equated to the same maintained footcandle basis.
- • Equal rates are used in amortizing the initial investment and allowing for interest, taxes and insurance.
- • Operating conditions, such as electrical energy rate, burning hours per year and starting frequency of the lamps are assumed to be the same.
- • Cleaning schedule is assumed to be appropriate to each system.
- • Uniform labor rates are used for estimating cost of installation, cleaning and relamping.

Table I shows the effect different light sources might have on costs of an industrial installation where the mounting height of the lighting equipment is less than 30 ft; Table II gives similar data for greater mounting heights.

The first part of both tables deals with factors that must be established before costs can be determined. The second part establishes the net costs of procuring and installing the various systems. (In estimating installation costs, aid may have to be obtained from a local electrical contractor.) Next, the annual operating cost is computed.

The total annual cost per luminaire is obtained by adding the annual owning cost per luminaire (Item 13) to the total annual operating cost (Item 21). The relative total annual cost for equal maintained footcandles is computed by multiplying the total annual cost per luminaire by the relative number of luminaires needed in a specific system for equal lighting intensity (Item 8) and dividing by the total annual cost per luminaire for the base system.

TABLE II—RELATIVE INITIAL, OPERATING AND TOTAL ANNUAL COSTS OF

LIGHTING SYSTEMS →		I		II		III		IV		V		VI		VII	
		1—1000-Watt PS-52 120 Volts		1—750-Watt R-52 120 Vol.s		2—H400-A1 240 Volts		2—H400-E1 240 Volts		2—H400-J1 240 Volts		2—H400-R1 240 Volts		2—H400-RC1 240 Volts	
BASIC DATA															
1. Rated initial lamp lumens per luminaire		23,400		12,500		31,000		42,000		40,000		36,000		41,000	
2. Lamp life		1,000		2,000		6,000		6,000		6,000		6,000		6,000	
3. Average watts per lamp		1,000		750		400		400		400		400		400	
4. Watts per luminaire (includes ballast watts)		1,000		750		860		860		860		860		860	
5. Coefficient of utilization (*a*)		0.52		0.69		0.51		0.52		0.51		0.59		0.55	
6. Maintenance factor (*b*)		0.76		0.80		0.73		0.65		0.65		0.79		0.75	
7. Effective maintained lumens per luminaire (Items 1 x 5 x 6)		9,260		6,900		11,530		14,200		13,250		16,800		16,910	
8. Relative number of luminaires needed for equal maintained ft-c.		1.00		1.34		0.802		0.652		0.699		0.551		0.547	
INITIAL COSTS															
9. Net cost of one luminaire (estimated)		$6.55		$5.00		$59.20		$59.20		$59.20		$59.20		$59.20	
10. Installation and distribution system cost per luminaire (estimated)		$94.80		$78.50		$119.70		$120.30		$120.30		$135.50		$135.50	
11. Net initial lamp cost per luminaire including tax (estimated) (*c*)		$1.80		$2.75		$15.60		$23.90		$29.10		$32.50		$31.20	
12. Total initial cost per luminaire (Items 9 + 10 + 11)		$103.15		$86.25		$194.50		$203.40		$208.60		$227.20		$225.90	
13. Annual owning cost per luminaire (15% of items 9 + 10) (*d*)		$15.20		$12.55		$26.85		$26.95		$26.95		$29.20		$29.20	
14. Relative initial cost for equal maintained footcandles (Items 12 x 8) for system compared / Item 12 for base system		1.00		1.12		1.51		1.28		1.41		1.21		1.20	
ANNUAL OPERATING COSTS															
15. Burning hours per year		2500	4000	2500	4000	2500	4000	2500	4000	2500	4000	2500	4000	2500	4000
16. Annual energy cost (Items 4 x 15 x rate in ¢ per kwhr) / 100,000	1¢ per kwhr	$25.00	$40.00	$18.75	$30.00	$21.50	$34.40	$21.50	$34.40	$21.50	$34.40	$21.50	$34.40	$21.50	$34.40
	2¢ per kwhr	$50.00	$80.00	$37.50	$60.00	$43.00	$68.80	$43.00	$68.80	$43.00	$68.80	$43.00	$68.80	$43.00	$68.80
17. Number of lamps replaced per year (Item 15 x no. lamps per unit) / Item 2		2.5	4.0	1.25	2.0	0.83	1.33	0.83	1.33	0.83	1,33	0.83	1.33	0.83	1,33
18. Lamp cost (Item 17 x net price per lamp including tax)		$4.55	$7.30	$3.45	$5.50	$6.50	$10.40	$9.95	$15.95	$12.10	$19.35	$13.50	$21.60	$12.95	$20.75
19. Labor cost of lamp replacements (*e*)		$3.90	$6.20	$1.95	$3.10	$1.30	$2.05	$1.30	$2.05	$1.30	$2.05	$1.30	$2.05	$1.30	$2.05
20. Cost of cleaning twice per year		$1.20	$1.20	—	—	$1.70	$1.70	$1.70	$1.70	$1.70	$1.70	—	—	$1.70	$1.70
21. Total annual operating cost per luminaire (Items 16 + 18 + 19 + 20)	1¢ per kwhr	$34.65	$54.70	$24.15	$38.60	$31.00	$48.45	$34.45	$54.10	$36.60	$57.50	$36.30	$58.05	$37.45	$58.90
	2¢ per kwhr	$59.65	$94.70	$42.90	$68.60	$52.50	$82.85	$55.95	$88.50	$58.10	$91.90	$57.80	$92.45	$58.95	$93.30
22. Relative annual operating cost for equal maintained footcandles (Items 21 x 8) for system compared / Item 21 for base system	1¢ per kwhr	1.00	1.00	0.93	0.94	0.72	0.71	0.65	0.64	0.74	0.73	0.58	0.58	0.59	0.59
	2¢ per kwhr	1.00	1.00	0.96	0.97	0.71	0.70	0.61	0.61	0.68	0.68	0.53	0.54	0.54	0.54
TOTAL ANNUAL COST															
23. Total cost per luminaire (Items 13 + 21)	1¢ per kwhr	$49.85	$69.90	$36.70	$51.15	$57.85	$75.30	$61.40	$81.05	$63.55	$84.45	$65.50	$87.25	$66.65	$88.10
	2¢ per kwhr	$74.85	$109.90	$55.45	$81.15	$79.35	$109.70	$82.90	$115.45	$85.05	$118.85	$87.00	$121.65	$88.15	$122.50
24. Relative total annual cost for equal maintained ft-c. (Item 23) x (Item 8) for system compared / (Item 23) for base system	1¢ per kwhr	1.00	1.00	0.99	0.98	0.93	0.86	0.80	0.76	0.89	0.84	0.72	0.69	0.73	0.69
	2¢ per kwhr	1.00	1.00	0.99	0.99	0.85	0.80	0.72	0.68	0.79	0.76	0.64	0.61	0.64	0.61
VISUAL COMFORT INDEX (*f*) (*g*) (*h*)		(*i*)		(*i*)		(*i*)		(*i*)		(*i*)		(*i*)		(*i*)	

Luminaires

Systems I, III, IV, V, VI, VII: Heavy-duty ventilated porcelain-enamel industrial reflectors.
II: Protective shield.
VIII: Open-top, well-shielded aluminum reflector.
IX, X, XI: Alzak aluminum large-diameter reflectors.
XII: Alzak aluminum reflector.
XIII, XIV: Open-top porcelain-enamel industrial reflectors; standard cool white lamps.

Tulamp ballasts are assumed for all mercury systems except XII.

a For Room Ratio, 1.25 (G), 50% ceiling, 30% walls. Calculated by Potter-Russell flux-ratio method.

b Includes mean lamp depreciation and mean dirt depreciation during life, with two cleanings per year.

c Initial lamp cost contributes to total initial cost per luminaire (Item 12), but not to annual owning cost per luminaire (Item 13). The annual cost of lamps is an operating cost, not an owning cost.

• Conversion to actual costs—The total annual cost per square foot can also be estimated from the values in the tables. It is obtained by multiplying the desired footcandle level by the total annual cost per luminaire and then dividing by the effective maintained lumens per luminaire (Item 7).

To convert from the relative costs given in the tables to actual dollars for a specific installation, the following steps should be followed:

1. Divide the effective maintained lumens per luminaire (Item 7) by the footcandle level desired in service, to obtain the lighted area per luminaire in square feet.
2. Divide the total area to be lighted by the area per luminaire just computed. The result is the number of luminaires needed.
3. Make a lighting arrangement for the total area based on the preceding calculations and determine the exact number of luminaires to be used.
4. For actual costs, multiply the number of luminaires by Item 12 to obtain the initial cost, by Item 13 to get the annual owning cost, and by Item 1 to find the operating costs; then add the annual owning cost and operating cost to obtain the total annual cost.

• Costs of combinations—The relative costs of a combination of systems can be found from the tables also:

Multiply the relative cost figures for each component lighting system by the percentage of light that each system contributes to the total output of the combination system. The sum of the resulting values is the relative cost of the combination system.

For example, suppose the relative costs are to be found for a high-mounted combination consisting of two H400-R1 mercury lamps (Column VI) and one 750 R52 filament lamp (Column II), with Column I of Table II as the base system. Employing Item 7 for the mercury and filament lamps, we find the total effective maintained lumens to be 16,800 + 6,900 = 23,700. Of this total, the H400-R1's contribute 71% and the 750 R52, 29%.

Then, the relative initial cost of the combination, using Item 14 in Table II for each component, is 1.21 × 0.71 + 1.12 × 0.29 = 1.18. Similarly, the relative annual operating cost for 2,500 hr at 1¢ per kwhr, using Item 22, is 0.58 × 0.71 + 0.93 × 0.29 = 0.68. And the relative total annual cost is 0.72 × 0.71 + 0.99 × 0.29 = 0.80.

HIGH-MOUNTED INDUSTRIAL LIGHTING SYSTEMS FOR EQUAL ILLUMINATION

LIGHTING SYSTEMS		VIII 2—H400-RC1 240 Volts Aluminum Open Top		IX 2—H1000-A15 460 Volts		X 2—H1000-C15 460 Volts		XI 2—H1000-RC15 460 Volts		XII 1—H3000-A9 460 Volts		XIII 2—96T12 120 Volts		XIV 2—96T12/RS 120 Volts	
BASIC DATA															
1. Rated initial lamp lumens per luminaire		41,000		108,000		103,000		106,000		132,000		10,100		14,600	
2. Lamp life		6,000		6,000		6,000		6,000		6,000		7,500		7,500	
3. Average watts per lamp		400		1,000		1,000		1,000		3,000		74		105	
4. Watts per luminaire (includes ballast watts)		860		2,100		2,100		2,100		3,155		178		250	
5. Coefficient of utilization *(a)*		0.59		0.58		0.59		0.60		0.48		0.43		0.42	
6. Maintenance factor (b)		0.76		0.62		0.58		0.64		0.65		0.80		0.76	
7. Effective maintained lumens per luminaire (Items 1 x 5 x 6)		18,400		38,800		35,250		40,700		41,200		3,480		4,660	
8. Relative number of luminaires needed for equal maintained ft-c.		0.502		0.238		0.262		0.282		224		2.66		1.99	
INITIAL COSTS															
9. Net cost of one luminaire (estimated)		$93.60		$90.00		$90.00		$90.00		$201.50		$44.00		$52.10	
10. Installation and distribution system cost per luminaire (estimated)		$135.50		$215.00		$215.00		$215.00		$316.00		$45.80 *(j)*		$52.80 *(j)*	
11. Net initial lamp cost per luminaire including tax (estimated) *(c)*		$31.20		$63.70		$70.85		$72.80		$33.15		$4.55		$5.00	
12. Total initial cost per luminaire (Items 9 + 10 + 11)		$260.30		$368.70		$375.85		$377.80		$550.65		$94.35		$109.90	
13. Annual owning cost per luminaire (15% of items 9 + 10) *(d)*		$34.35		$45.75		$45.75		$45.75		$77.65		$13.45		$15.75	
14. Relative initial cost for equal maintained footcandles (Items 12 x 8) for system compared / Item 12 for base system		1.27		0.85		0.95		0.83		1.19		2.43		2.12	
ANNUAL OPERATING COSTS															
15. Burning hours per year		2500	4000	2500	4000	2500	4000	2500	4000	2500	4000	2500	4000	2500	4000
16. Annual energy cost (Items 4 x 15 x rate in ¢ per kwhr) / 100,000	**1¢ per kwhr.**	$21.50	$34.40	$52.50	$84.00	$52.50	$84.00	$52.50	$84.00	$78.90	$126.20	$4.45	$7.10	$6.25	$10.00
	2¢ per kwhr.	$43.00	$68.80	$105.00	$168.00	$105.00	$168.00	$105.00	$168.00	$157.80	$252.40	$8.90	$14.20	$12.50	$20.00
17. Number of lamps replaced per year (Item 15 x no. lamps per unit) / Item 2		0.83	1.33	0.83	1.33	0.83	1.33	0.83	1.33	0.42	.67	.67	1.07	0.67	1.07
18. Lamp cost (Item 17 x net price per lamp including tax)		$12.95	$20.75	$26.40	$42.30	$29.35	$47.00	$30.20	$48.40	$13.90	$22.20	$1.50	$2.45	$1.70	$2.70
19. Labor cost of lamp replacements *(e)*		$1.30	$2.05	$1.30	$2.05	$1.30	$2.05	$1.30	$2.05	$.80	$1.30	$.85	$1.40	$0.85	$1.40
20. Cost of cleaning twice per year		$1.90	$1.90	$1.90	$1.90	$1.90	$1.90	$1.90	$1.90	$2.20	$2.20	$2.00	$2.00	$2.00	$2.00
21. Total annual operating cost per luminaire. (Items 16 + 18 + 19 + 20)	**1¢ per kwhr**	$37.65	$59.10	$82.10	$130.25	$85.05	$134.95	$85.90	$136.35	$95.80	$151.90	$8.80	$12.95	$10.80	$16.10
	2¢ per kwhr	$59.15	$93.50	$134.60	$214.25	$137.55	$218.95	$138.40	$220.35	$174.70	$278.10	$13.25	$20.05	$17.05	$26.10
22. Relative annual operating cost for equal maintained footcandles (Items 21 x 8) for system compared / Item 21 for base system	**1¢ per kwhr.**	0.55	0.54	0.56	0.57	0.64	0.65	0.57	0.57	0.62	0.62	0.68	0.63	0.62	0.59
	2¢ per kwhr	0.50	0.50	0.54	0.54	0.60	0.61	0.53	0.53	0.66	0.66	0.59	0.56	0.57	0.55
TOTAL ANNUAL COST															
23. Total cost per luminaire (Items 13 + 21)	**1¢ per kwhr**	$72.00	$93.45	$127.85	$176.00	$130.80	$180.70	$131.65	$182.10	$173.45	$229.55	$22.25	$26.40	$26.55	$31.85
	2¢ per kwhr	$93.50	$127.85	$180.35	$260.00	$183.30	$264.70	$184.15	$266.10	$252.35	$355.75	$26.70	$33.50	$32.80	$41.85
24. Relative total annual cost for equal maintained ft-c. (Item 23) x (Item 8) for system compared / (Item 23) for base system	**1¢ per kwhr.**	0.73	0.67	0.61	0.60	0.69	0.68	0.60	0.59	0.78	0.74	1.19	1.00	1.06	0.91
	2¢ per kwhr.	0.63	0.58	0.57	0.56	0.64	0.63	0.56	0.55	0.76	0.72	0.95	0.81	0.87	0.76
VISUAL COMFORT INDEX *(f) (g) (h)*		90		*(i)*		*(i)*		*(i)*		*(i)*		77		62	

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d Ten-year write-off at 10% per year, plus 5% for interest, insurance, and taxes.

e Assumed: $1.55 lamp for 1000PS52, 750R52, 400- and 1000-watt mercury; $1.90 lamp for H3000-A9; $1.30 lamp for high-mounted fluorescent without starters.

f Per cent of people who would be expected to appraise the lighting system as comfortable when seated at the middle of the rear wall looking horizontally. Does not consider reflected glare.

g For approximately 50 footcandles in a space 80′ x 140′ with luminaires mounted 44 feet high.

h For additional information see "Visual Comfort Index Data and Tables" by Meaker & Oetting.

i Probably less than 5%.

j In a typical installation, 277-volt distribution will result in approximately 15% lower installation and distribution system cost.

Progress in Pittsburgh....

ALLEGHENY COUNTY AUTHORITY

SPECIFIES **LONG LENGTH**
CONCRETE PIPE
with

RUBBER and STEEL
AMSEAL JOINTS

In keeping with Pittsburgh's remarkable record of progress, the Allegheny County Sanitary Authority is presently constructing an $80,000,000 combined sanitary and storm sewerage system designed to serve 70 communities. Pittsburgh's famous rivers and streams will benefit enormously from this big cleanup job which is one of the largest of its kind in the United States.

American-Marietta's up-to-the-minute facilities in Pittsburgh are supplying many miles of high-quality, long-length concrete pipe with Amseal Joints to many of the nation's leading contractors for their work on both tunnel and open-cut interceptors. Approximately 50 varying sizes and designs are being made on schedule to meet the project's anticipated completion date.

The Amseal rubber and steel joint provides positive protection from both leakage and infiltration while the hard, dense, high-strength concrete guards against devastating and erosive sewage. Long lengths (16 ft.) speed installation, reduce number of joints, and mean real savings to owners both in construction and in operation.

Our technical staff will be pleased to assist you with your pipe problems.

A-M

AMERICAN-MARIETTA COMPANY
CONCRETE PRODUCTS DIVISION
GENERAL OFFICES:
AMERICAN-MARIETTA BUILDING
101 EAST ONTARIO STREET, CHICAGO 11, ILLINOIS, PHONE: WHITEHALL 4-5600

Guide for Television Station Cost Estimates

R. D. Chipp, Director of Engineering
Allen B. DuMont Laboratories, Inc.
East Paterson, New Jersey

In three areas—acoustic treatment, air conditioning and lighting—TV stations present their own special problems in cost estimating.

For preliminary estimates for use in development and financing programing before completed plans are ready for precision estimating (and as a check on the latter) the following unit prices apply, as of 1955, in the Northeastern part of the United States, abstracted from a paper that was presented to the National Association of Television Broadcasters.

For both acoustic treatment and air conditioning second methods are given along with their unit prices to provide cross-check estimates.

Unit Costs of Television Plants Equipment and Towers not included

BUILDINGS	Transmitter Building	New Office Building	Studio conversion shell only	Studio new
Cost per sq ft, floor area	$20.00	$30.00	$15.00	$30.00
Average, or typical size, ft	70 x 35	90 x 80 x 20	60 x 40,	40 x 20
sq ft	2450	8000	2400,	800

COMPONENTS OF BUILDINGS	Office $ per sq ft of floor area	Studio
Floor Covering	$0.30	$0.50
Acoustic Treatment (studios $1.50–2.00)	0.50	1.75
Air Conditioning, no diversity	10.00	10.00
diversity factor 0.75	7.50	7.50
Electrical work, general	2.25	2.25
Lighting and rigging, average		10.00
Monochrome		9.90
add for 10-scene preset board		3.50
Color, live, except Vitascan		11.60
Vitascan		7.75
add for 10-scene preset board		5.25

2nd Method Unit Costs

Acoustic Treatment, studio, per sq ft of area covered	$0.60–1.00
Heating & Air conditioning, no diversity, per ton	$600–$1,000
Audio/Video wiring, per connection	$1.50

LAND IMPROVEMENTS

Clearing and grubbing	acre	$600.00
Excavating, power	cu yd	1.00
hand	cu yd	5.00
Grading, rough	cu yd	0.35
finish	sq yd	0.15
Parking area and roadways	sq yd	2.50
Fencing	lin ft	3.00

• **Air conditioning**—Method 1 uses $10 per sq ft of floor area and applies a diversity factor to correct for special conditions.

Method 2 uses $1,000 per ton (down to $600 in some locations) after the diversity factor has been applied.

This differential is largely in the case of labor.

The DIVERSITY FACTOR adjusts for conditions less than maximum.

For example, in studios where a few large audiences must be accommodated and with limited back-to-back operation, the diversity factor would amount to 0.75.

Method 2 requires knowledge of these factors: heat load, cubic feet of space per minute to be cooled from which the amount of refrigeration in tons can be determined.

Heat load includes:

Lighting, general	W/sq ft	4
Studio, monochrome	W/sq ft	24
live color	W/sq ft	100
Vitascan	W/sq ft	4
Persons	W/each	150
Equipment Radiation	W/rack	600

Cu ft/min to be cooled: Divide volume of space in cu ft by 10 (6 air changes/hr or 1 air change/10 min)

Refrigeration needed: Allow 1 ton/400 cfm plus 1 ton/4 KW

• **Lighting and rigging**—Based on electrical costs of $6/man-hour, lighting and rigging costs run like this:

• **Power requirements** for TV installations include the following:

Lighting, General	W/sq ft	4
Studio, monochrome	W/sq ft	25
Live Color	W/sq ft	100
Vitascan	W/sq ft	4
Camera Chaine	W	1700
Equipment Racks	W	1500
Air Conditioning	W/ton	1000

Miscellaneous: add as needed for shop tools, elevators, signs, etc.

Item	Per square foot Monochrome 100 fc	Color 400 fc	Vitascan 400 fc
Connector Strips	$1.20	$1.40	
Fixtures	1.40	2.20	
Light Control	2.30	2.75	
Installation	2.50	2.75	$1.25
Sub-total	$7.40	$9.10	
Sync lights			4.00
Rigging (installed)	2.50	2.50	2.50
Total	$9.90	$11.60	$7.75
Add for 10-scene preset board	3.50	5.25	5.25
Total	$13.40	$16.85	$13.00

How to Estimate Lock Costs

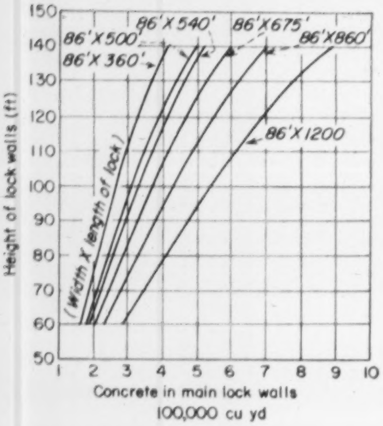
Michael Spero
Civil Engineer
Seattle, Wash.

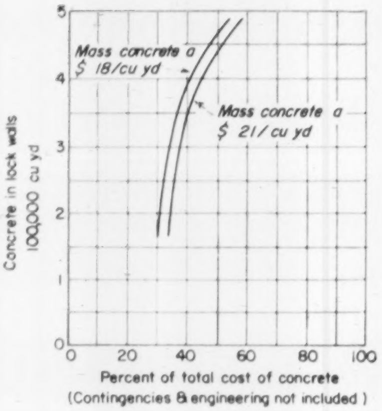
Using two simple graphs, preliminary estimates of navigation lock costs can be obtained with much the same facility provided by cost per sq ft for buildings, per kw for power and per sq yd for highways.

Through study of many existing gravity-type locks and costs it has been determined that the controlling factor is the yardage of mass concrete in the main lock walls.

The accompanying graphs represent a simple collection of arithmetic data and can be used for locks having gravity walls as follows:

• Obtain the mass concrete amount





from Fig. 1 knowing lock wall dimensions.

- Find the percentage of total cost this represents from Fig. 2.

Then the computation involves simply multiplying out the yardage, price of concrete in place and percentage, as shown in the accompanying examples.

In his studies, the writer found that, percentage wise, the cost of mass concrete varied from 36% for short locks to 55% for the longer locks with higher walls. Estimates of concrete quantities are not sensitive to variations in lock width. However, miter gate costs will double if the width is increased from say 86 ft to 110 ft. But, gate costs for an 86-ft width run only about 5% and an allowance can easily be made in the preliminary estimates for wide locks.

EXAMPLES:

1. For an 86 x 540-ft navigation lock with walls 75 ft high and concrete costing $21 per cu yd in place, to obtain preliminary cost estimate:
   a) From Fig. 1, mass concrete in main lock wall is 240,000 cu yd
   b) From Fig. 2, concrete represents 35.5% of cost of principal work items
   c) Compute 240,000 cu yd x $21 + .355 = $14,200,000

Contingencies, 15%	2,130,000
Total Direct Cost	$16,330,000
Engineering and Indirect Cost, 10%	1,633,000
Total Cost	$17,963,000
Say	$17,960,000

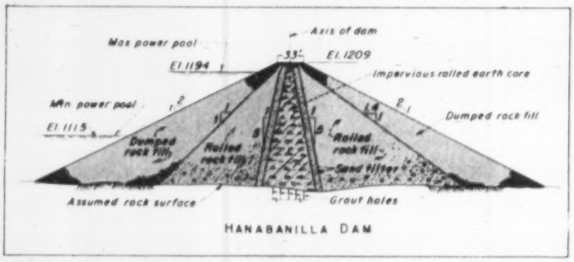
For this same lock, total cost estimated from preliminary design and a listing of principal work items was $17,600,000.

Cuba's Underground Powerhouse and Dams Attract International Bidding

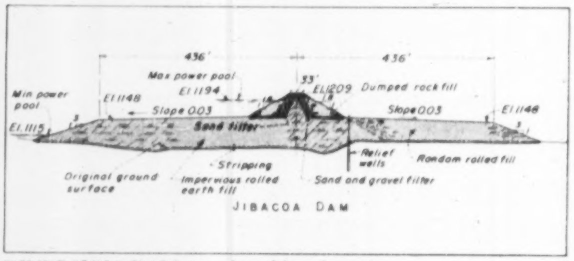
The two big construction contracts for Cuba's 45,000-kw Hanabanilla hydro project drew bids from Cuba, the U. S. and from one U. S.-Cuban joint venture. The unit prices shown here, in Cuban pesos, 1 CP = $1.02 including the 2% conversion tax, cover the underground excavation for powerhouse, tunnels and dams but not the international bidding for the power equipment (ENR June 14, p 73). PRICHEC, short for Primera Central Hidroelectrica Cubana, is the owner. TAMS, Tippetts - Abbett - McCarthy - Stratton, is its consultant.

Tecon Corporation of Dallas, Texas, at 5,168,510 CP placed low for the underground powerhouse excavation, 6% above the engineer's estimate but 23% below the 2nd bidder and 51% below the high of eight bids. In addition, Tecon, in its bid, indicated willingness to lower prices of all tunnel excavation by $2 per cubic meter for a 6-month extension of completion time. This amounted to 300,000CP.

Three weeks later (Nov. 25, 1955) Ingenieria G. del Valle, S A of Havana, with a low of 3,194,129 CP, took the contract for dams on closer bidding, 4% under the engineer's estimate, 11% under Tecon's second bid and 34% under the high of five bids.


Axis of dam
Max power pool
33'
El. 1209
El. 1194
Impervious rolled earth core
Min power pool
2
1
Dumped rock fill
El. 1115
Dumped rock fill
Rolled rock fill
Rolled rock fill
Sand filter
Assumed rock surface
Grout holes
HANABANILLA DAM

PROJECT'S MAIN DAM is a rockfill structure.


436'
436'
Max power pool
33'
Min power pool
El 1148
El 1194
El.1209
Dumped rock fill
Slope 0.03
Slope 0.03
El 1148
El. 1115
Sand filter
Relief wells
Random rolled fill
Stripping
Original ground surface
Impervious rolled earth fill
Sand and gravel filter
JIBACOA DAM

DIVERSION DAM is a broad-based earth.

Jibacoa, the diversion dam, with no spillway, will be 130 ft high. It is a broad-based berm, topped by a small rockfill dam with a rolled earth core.

Hanabanilla dam is 850 ft long at the crest and 154 ft above bedrock. It will have a rolled, impervious core. Under this a grout curtain will seal diorite gneiss rock. Two rock zones bound each side of the core. The inner zones are rolled rockfill, the outer zones are conventional dumped rockfill. The saddle-type uncontrolled spillway is 370 ft wide, through rock with a concrete sill. Two small dams will fill two low saddles, a trapazoidal, unlined canal through the low divide between the two watersheds will connect the Jibacoa-Hanabanilla branches to form a 2,500-acre reservoir.

The PRICHEC Board is headed by Emeterio S. Santovenia, President. Eugenio Castillo is General Manager.

The TAMS, L. A. Lovell, associate partner, directs the work. P. S. O'Shaughnessy is resident manager in Cuba and A. S. Goodman is project engineer in New York.

Underground Excavation for Powerhouse

1C	Tecon Corp., Dallas, Tex	CP5,168,510
2	Conticca, Denver, Colo	6,676,540
8	Brown & Root, Houston, Tex	11,917,457
EE	Tippetts-Abbett-McCarthy-Stratton	4,815,908

Item Bids: 10-14-55	Unit	Quantity	Unit Prices 1 C	 Range
Exc, open cut, earth	cm	3,000	P 0.65	P 0.50-10.00
rock	cm	72,000	1.70	2.00-10.00
tailrace tunnel	cm	122,500	19.50	26.00-44.45
underground chambers	cm	14,700	22.00	26.00-43.00
penstock shaft	cm	3,200	23.00	35.00-156.00
service tunnel	cm	12,300	20.00	30.00-95.00
pumping	10³ml	40,000	6.00	0.50-8.30
Rock trimming	sm	1,000	2.50	3.00-25.00
Line drilling & broaching	sm	100	12.00	14.00-100.00
Steel, struct. supports	kg	600,000	0.65	0.35-0.85
roof bolt assemblies	kg	150,000	0.60	0.40-2.60
Timbering	cm	150	130.00	83.80-700.00
Drilling, drain holes, conc, rk	lm	2,200	5.00	2.00-15.00
grout holes, 0-1500 m	lm	1,500	18.00	3.20-33.31
1500-4000 m	lm	2,500	15.00	3.30-15.00
Pipe, steel & fitgs, grtg	kg	1,180	1.00	1.40-5.00
CI or WI drainage	kg	40,000	0.60	0.64-4.00
Grout, portland cement	cm	170	80.00	40.00-112.50
mineral filler	cm	10	100.00	25.00-154.00
sand	cm	20	14.00	7.00-50.00
fluidifier	cm	300	3.50	1.00-5.00
mixing, placg, consolidatn	cm	190	90.00	23.00-315.00
Contact grouting	cm	280	90.00	90.00-90.00
Connections to grout holes	ea	2,500	7.50	7.50-7.50
Dry packing	cm	600	8.00	8.00-36.00

Fine Aggregate from Rock, Alt. from Sand

Conc, plant incl process plnt for crs & fine agg	ls	job	250,000	60,000-677,686
tailrace tun lin'g, except inv	cm	8,000	35.00	35.00-106.00
tailrace tunnel invert	cm	6,700	35.00	25.00-113.00
service tun lin'g, excpt inv	cm	4,000	45.00	30.00-98.00
invert	cm	300	55.00	35.00-108.00
underground chambers	cm	1,250	50.00	45.00-125.00
Alt. Conc, Plant	cm	1,250	50.00	34,625-576,400
tlrc tun lin'g, excpt inv	cm	1,250	50.00	38.00-106.00
invert	cm	1,250	56.00	28.00-113.00
service tun lin'g	cm	1,250	50.00	35.00-98.00
invert	cm	1,250	50.00	35.00-108.00
underground chambers	cm	1,250	50.00	40.00-125.00
Steel, reinf	kg	200,000	0.39	0.30-0.60
Rubber water stops	lm	700	15.00	4.00-24.00
Wire mesh	kg	5,000	0.70	0.40-1.75
Pneumatic mortar	cm cmt	150	55.00	70.00-570.00
Field office & housing for engrs	ls	job	33,000	15,000-55,000

Adjustment prices, if Int. Section is Increased or Decreased ,

Exc, penstock shaft 20% incr	cm	3,840	P 22.00	33.00-137.00
20% decr	cm	2,560	24.00	38.00-167.00
service tunnel 40% incr	cm	17,220	19.00	26.00-95.00
40% decr	cm	7,380	25.00	37.00-165.00
Conc, serv tun, 20% incr rock ag	cm	4,800	44.00	40.00-93.00
20% decr rock ag	cm	3,200	50.00	45.00-106.00
20% incr, nat sand agg	cm	4,800	44.00	50.00-93.00
20% decr, nat sand agg	cm	3,200	50.00	40.00-106.00

Hanabanilla, Saddle Rock, & Jibacoa Dams

1C	Ingenieria G. Del Valle, Havana, Cuba	CP3,194,129
2	Tecon Corp., Dallas, Texas	3,581,585
5	Asociacion de Contratistas Independientes, Havana, Cuba	4,867,753
EE	Tippetts-Abbett-McCarthy-Stratton, N.Y.	3,330,245

Items Bids: 11-25-55	Unit	Quantity	Unit Prices 1 C	 Range

Care Water, Prepare Site, Grout—Entire Contract

Div & care water dur const				
H & S dams	ls	job	P 15,066	P 3,000-25,342
Jibacoa dam	ls	job	20,000	25,800-74,407
Clearing	hectr	800	125.00	136.00-150.00
Grubbing	hectr	17	250.00	272.00-5,620
Drill, rock for grout pipes	lm	270	10.00	2.00-15.98
Steel pipe & ftgs, grt pips	kg	1,400	2.00	0.95-1.30
Drill grt holes 0-2500	lm	2,500	8.00	10.31-25.00
2500-6500	lm	4,000	7.50	7.79-18.00
exploratory holes	lm	320	20.00	28.31-37.40
Pres tst explr holes, hyd	hour	25	100.00	15.00-20.74
Grout, Portland cement	cm	270	67.00	4.41-125.00
soil in soil-cement	cm	280	1.50	2.82-24.00
mix & place	cm	550	91.00	46.33-200.00
Conns to grt holes, direct	ea	1,000	7.50	7.50-7.50
packer hookup	ea	75	10.00	10.00-10.00

Items Bids: 11-25-55	Unit	Quantity	Unit Prices 1 C	 Range

Excavation

Exploratory shafts, spillway	lm	35	37.20	77.44-150.00
Exc, stripping	cm	17,400	0.45	0.41-0.82
earth, spillway	cm	26,000	0.60	0.27-1.00
H & S dams	cm	5,200	0.80	0.68-0.75
Jibacoa dam	cm	4,600	0.80	0.27-1.00
rock, spillway	cm	181,000	1.80	1.67-3.00
uncl tlrc tun outl chan	cm	18,100	1.90	2.11-7.32
rock, H & S dams	cm	2,300	3.50	2.00-3.24
Jibacoa dam	cm	5,200	3.30	2.04-3.24
uncl, chan thru res divd	cm	350,000	0.48	0.38-0.45

Embankment H & S dams

Emb, dumped rock fill from exc	cm	127,000	0.25	0.30-0.34
rolled rock fill	cm	127,000	0.40	0.16-0.50
rockfill, dumpd f by other	cm	46,000e	0.50	1.36-1.50
rolled	cm	56,000e	0.70	0.82-1.75
filter	cm	41,000	1.30	1.30-4.07
rolled earth fill	cm	110,400	0.78	0.75-1.20
addl rolling for compact	Rhr	325	12.00	14.00-28.21

Embankment Jibacoa dam

Emb, dumped rockfill	cm	165,000	2.10	2.11-3.42
filter	cm	55,000	3.30	2.20-5.10
rolld earth fill, imperv	cm	1,325,000	0.70	0.57-1.13
random	cm	550,000	0.68	0.57-1.10
addl rolling for compact	Rhr	675	12.00	14.00-28.21

Relief Well System Jibacoa dam

Relief wells	lm	165	27.00	22.00-200.00
riser pipe	lm	220	10.50	17.00-26.82
well screens	lm	135	102.00	118.00-300.00
sand & gravel pack	cm	40	10.00	15.00-22.00
collector pipe, 8" φ	lm	270	16.00	12.50-32.03
10" φ	lm	190	20.00	15.56-80.00

Spillway & diversion conduit

Conc, diversion conduit	cm	1,500	20.00	13.22-60.00
spillway	cm	250	10.00	4.50-60.00
plug	ls	job	1,200	400-6,371
Steel, reinf	kg	212,000	0.28	0.28-0.42
Rubber water stops 6"	lm	60	12.00	8.00-13.69
9"	lm	90	15.00	12.00-20.49
Valve, Howell-Bunger 8" φ	ea	1	5,020	4,800-6,505
lubricated plug 18" φ	ea	1	2,100	1,800-4,094
CI pipe & fittings	kg	44,500	0.50	0.37-0.79
Misc metal	kg	300	2.00	3.70-4.00

Roadway Surfacing & Planting

Crushed stone surfacing	cm	1,400	9.00	5.90-9.01
Fertilizer	kg	2,800	0.60	0.20-0.11
Topsoil & seeding	sm	56,000	0.60	0.05-0.45

•cm . . . cubic meter •lm . . . linear meter •kg . . . kilogram •CP . . . Cuban Peso •sm . . . square meter •lr . . . liter •hectr . . . hectare

•e . . . embankment—dumped & rolled fill by others is available in stockpiles

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To Recoup Cooling Water Cost

An interesting use of hydroelectric power to regain at least part of the cost of pumping cooling water at a proposed steam power plant is in the offing, probably to be accomplished but still in the early stages of planning at this point.

Unusual conditions are back of this unusual proposal.

A planned steam power station of Potomac Electric Power Company is to be located on the Potomac River upstream from the site of a planned flood-control dam of the Corps of Engineers. The dam is not yet a reality; neither is the powerhouse. But it is figured that the power installation will be constructed and operating before the dam is built, before its reservoir is formed.

This means that the steam power station, if it is to be on the shore of a future lake, must be built well above the present shoreline of the river. And condensing water will of necessity be pumped up to cool the units of the coal-fired plant.

The pumped cooling water will, of course, discharge back to the Potomac River, but it is envisaged that it can be put to work on its way down to the stream so as to regain some of the energy—and therefore the cost.

The idea, as far as it has been developed, is to install a small turbine-generator, a hydroelectric power plant on the cooling-water discharge line.

Such a scheme would be quite unusual. It is not normal to put a steam power station so far above its cooling water source. But the exigencies of this particular situation—at least temporarily—would require the excessive pumping, while also making feasible the cost recoup in power production.

DON'T COMPROMISE ON DESIGN FREEDOM!

Now, your equipment can be lighter, stronger, tougher—made with economical new Lukens "T-1" steel!

■ The unique qualities of this amazing new material offer you greater design freedom than ever before in a high-strength steel! It has unusual resistance to impact, abrasion and atmospheric corrosion. It's tough and *stays* tough at low temperatures. And it combines these qualities with *triple* the yield strength of ordinary carbon steel! These advantages are changing the design of equipment and machinery in a growing number of industries.

Users like new Lukens "T-1" steel because its strength and toughness mean lighter, more efficient equipment. Because such equipment lasts longer, delivers better overall performance. Because it means lower maintenance and replacement costs.

No wonder this remarkable steel is finding its way into so many new plans. And Lukens "T-1" steel can be had in the widest range of plate sizes available anywhere!

Whether you want specific product information or the best ways to make the most of it, write for **24-page illustrated booklet LUKENS "T-1" STEEL**, to Manager, Marketing Service, 848 Lukens Building, Lukens Steel Company, Coatesville, Pennsylvania.

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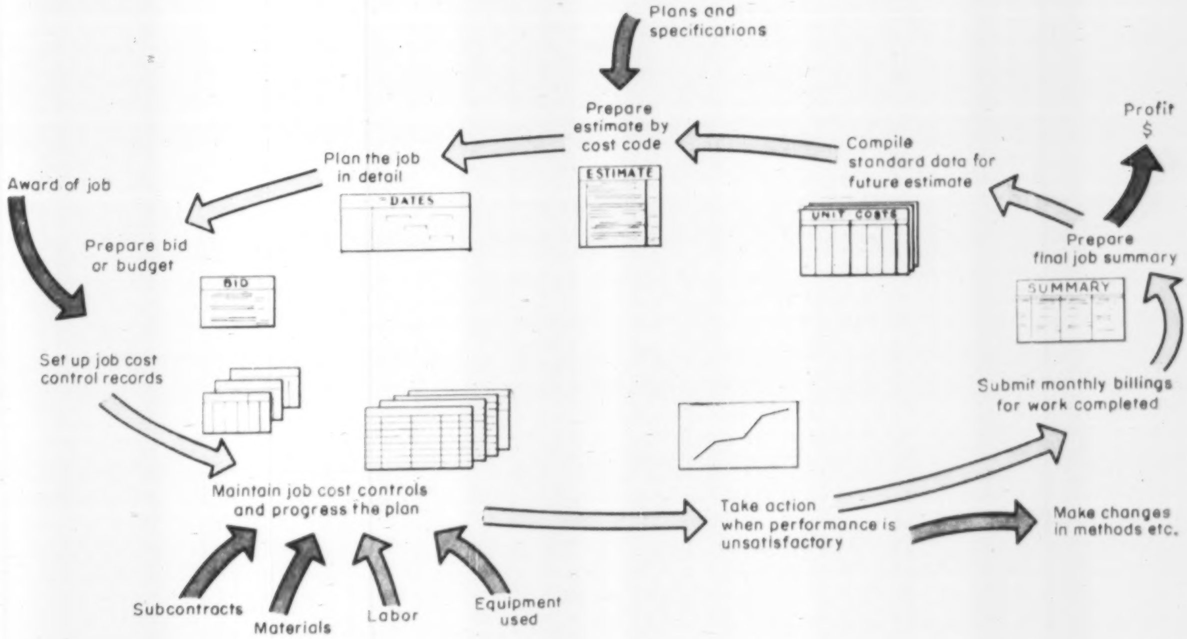
THE NEWEST IN A COMPLETE LINE OF ALLOY STEELS
LUKENS STEEL COMPANY, COATESVILLE, PENNSYLVANIA


Plans and specifications
Prepare estimate by cost code
ESTIMATE
Profit $
Compile standard data for future estimate
Plan the job in detail
DATES
Award of job
UNIT COSTS
Prepare final job summary
Prepare bid or budget
BID
SUMMARY
Set up job cost control records
Submit monthly billings for work completed
Maintain job cost controls and progress the plan
Take action when performance is unsatisfactory
Make changes in methods etc.
Subcontracts
Materials
Labor
Equipment used

JOB CONTROL CYCLE, reflecting steps from original estimate to final profit, reveals spots where paperwork efficiency pays off.

Contractor Streamlines Cost Control, Reduces Paper Work

Robert Galloway, P.E.
Wallace Clark & Company, Inc.,
New York, N. Y.

With business growing faster than its accounting system could turn out current costs, F. W. Brown Company, Building Contractors in Yantic, Conn., faced two major problems:

How to get current costs in time to take correction measures when necessary.

Where to add to the clerical staff to relieve the overload of paper work.

To speed up a solution, Bill Brown, President, called in the author as a management consultant for a quick survey of both office and field procedures and for a look into the job progress and cost control reports in use.

The survey was made and the following corrective measures were proposed, adopted, installed and working within a few weeks.

Basically the system in use was good. The few weak spots were due mainly to the rapid growth of a business started in 1946.

The changes include:

Forms for both office and field use were redesigned.

Procedures were changed to eliminate or simplify several clerical operations.

Job cost control system was revised to compare percentage of physical completion each week to the planned rate of expenditure.

Anticipated final cost was computed each week.

Estimating methods were revised to use standard cost codes.

Job cost estimates were used as the foundation for all controls—**including standard unit cost data for future estimating.**

This streamlining and consolidation of paper work benefited both field superintendents and office staff with these results:

Additional office staff was not needed.

Earlier cost data became available, so that corrective action could be taken in "trouble" areas.

The company is in a better position to take on more work.

The Job Control Cycle in the chart shows where paper work can speed up or bog down a job, can make or break it profitwise.

• **The estimate:** Standard cost codes should be used.

Each job cost estimate should be set up so that it becomes the basis for all cost controls on that job.

The estimating department should be constantly informed on current cost performance by feeding back to it standard unit costs of current work.

• **Planning the job:** This should be in detail, not only the methods and types of equipment but the scheduling and timing.

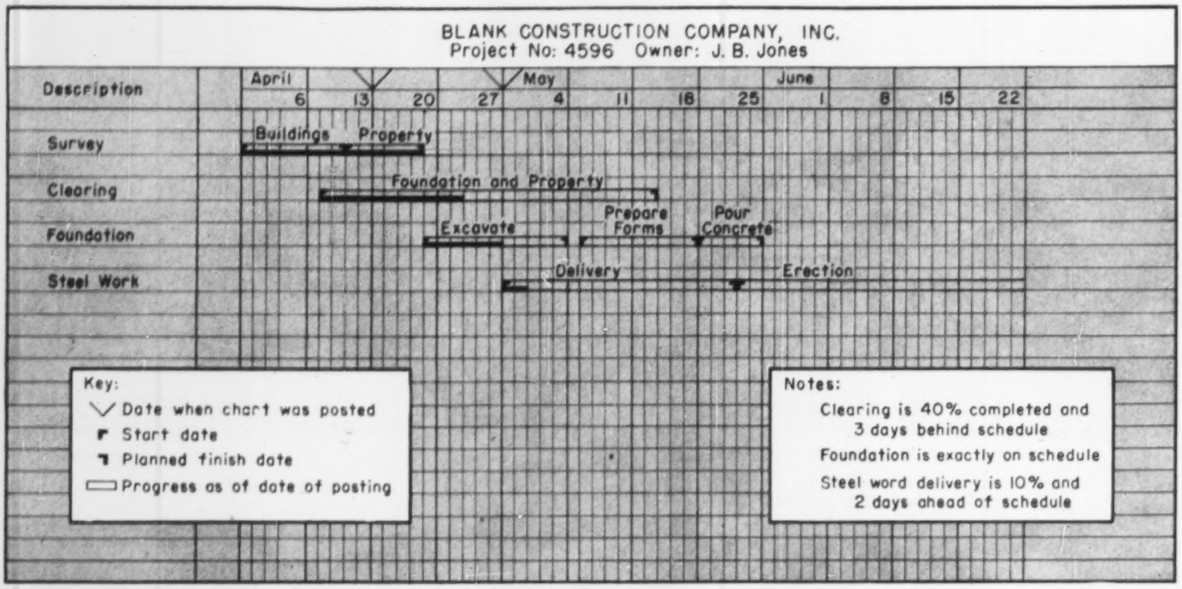
For this the standard Gantt type time charts so widely used for scheduling factory production, work equally well on a construction job.

These facilitate scheduling by years-months-weeks, months-weeks-days or weeks-days-hours.

They are useful for scheduling sequence and timing of operations such as labor hiring by trades, when equipment is needed, when subcontractors must start and finish, when materials must be delivered and cash flow requirements.

These planning charts become the basis for measuring progress both quantitatively and percentagewise. Thus, they are the key to the cost control problem that is tied into comparing physical completion each week to planned rate of expenditure.

• **Set up cost control records**—With the basic structure for cost controls set up before the bid is placed, the contract



STANDARD GANTT-TYPE blank charts facilitate both scheduling and progress control of construction projects.

award throws the hiring, purchasing, subcontracting, machinery scheduling wheels into gear and the cost controls have to match this activity and keep up with its speed.

For each cost code the estimates for labor, materials and equipment charges are set up on the corresponding Job Cost Code Card. Estimated units of work at this time are also entered on the cards.

Separate Cost Code Cards are set up for each subcontract to be awarded.

• **Maintain job cost controls**—The Daily Superintendent's Report transmits the distribution of labor expended, materials received tickets, and the equipment used record.

Penny accounting is not needed. Entries for labor charges can be made on the basis of average pay rates, and extended to the nearest dollar. Costs of material delivered to the job site are entered not less than once a week on the basis of unit prices secured at time of placing the order. The necessity for early cost data does not usually permit waiting for invoices to be submitted.

Once a week the Superintendent's Reports also transmits the percentage of work completed on each cost code, so that the final completed cost of each cost code, and for the job, can be calculated on the basis of rate of expenditures to date.

Planning charts are also progressed each week to give a graphic picture of progress against plan.

• **Take action when performance unsatisfactory**—The job Cost Code Cards together with the progress planning charts show where action is required. Items can go sour because extra work is being performed (perhaps an extra is in order), poor job methods are being followed, or for a number of other reasons. The important thing is to bring the problem areas to the attention of everyone concerned at an early date, so that corrections can be made before it is too late to show a profit.

• **Submit monthly billing for work completed**—Monthly billings are prepared directly from the Job Cost Code Cards. All information is at hand immediately after the close of the month. Special reports from the field which will delay processing the billing, are not needed.

• **Prepare final job summary**—This not only shows the results of the current job, but, more important, provides the benchmarks for preparing the estimate for the next job.

• **Compile standard data**—To complete the Job Control Cycle, unit costs are prepared from the final job summary. These are used to revise or support standard data retained by the estimator.

F. W. Brown Company has under construction a number of school buildings, two factory additions, several church buildings, a shopping center and, in addition, a number of smaller jobs. It has recently built its own headquarters building including a complete woodworking shop. Bill Brown had experience in an uncle's contracting business, then served with the Seabees before establishing his own business.

Wallace Clark & Company, Inc. has worked with a number of contractors and engineering firms, including several assignments on planning for engineering work and improving utilization of the engineering talent at hand.

Orderly Tabulations for Cost Control

Discussion of ways to control construction costs is as active in Great Britain as in the United States. At a recent conference on the subject at London's Building Center, as reported in The Builder (London) J. Nesbit, principal quantity surveyor (chief estimator) to the Ministry of Education, emphasized the necessity of providing the architect and the client with the costs of a building related to its elements, such as roof, walls, foundations, etc. By orderly tabulations of figures on this basis, different sizes and constructions of buildings could be readily compared. In addition, an accumulation of such figures was useful in controlling the costs of future buildings.

The Ministry of Education uses a cost analysis method in which the measurement yardstick is the cost per sq ft. of floor area. Each building is broken down into a number of small and convenient elements, common to all buildings. Tabulations are then drawn up consisting of a list of these elements, each with its cost given in terms of square feet of floor area.

The elements used in a school building tabulation for example were placed in the following groups: non-construction elements; structural elements; partitioning elements; finishing elements; fitting elements; service elements; and playground elements.

This tabulation, said Mr. Nesbit, has proved very useful in pinpointing the location of excessive or insufficient expenditure. It has also saved many hours of fruitless discussion.

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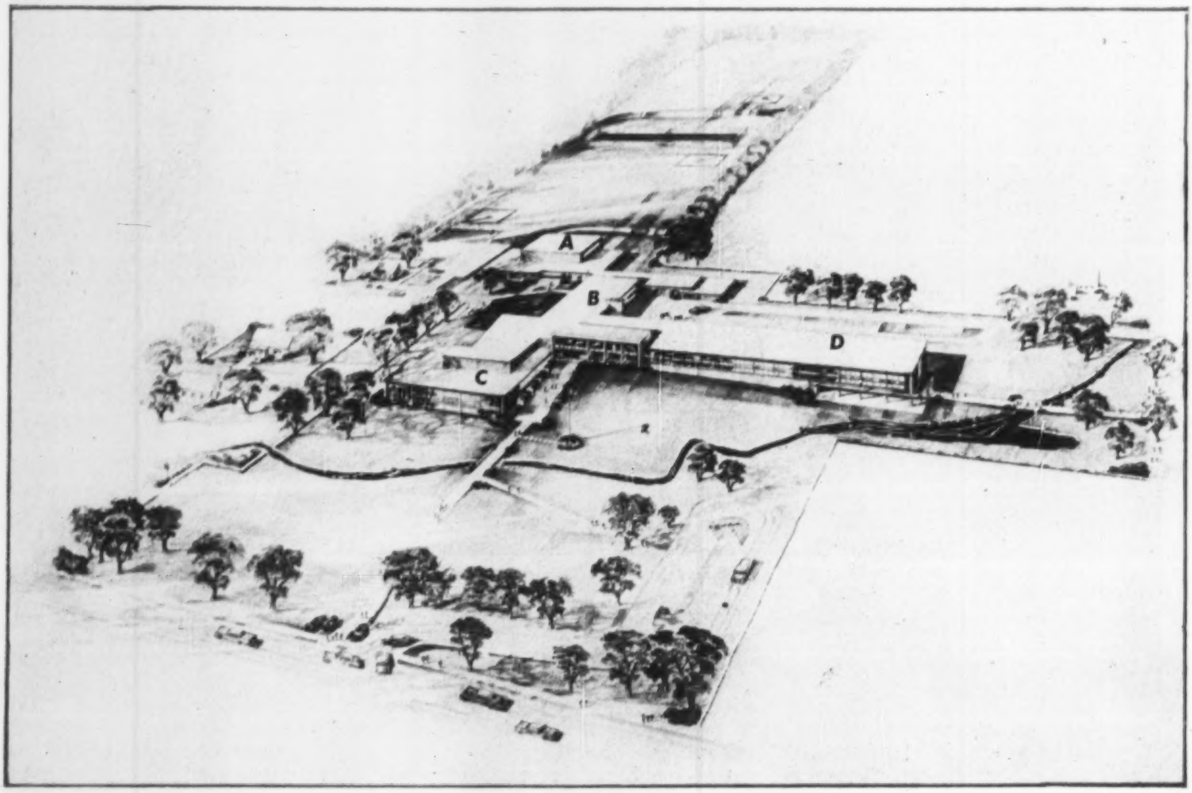


TEANECK ROAD Junior High School cost $1,990 per pupil. The letters identify facilities described in the text.

Budget Balancers Built Into School Bids

Anticipating a possible need for painful re-appraisal when the bids came in for its second junior high school, the Board of Education, Teaneck Township, New Jersey, took bids on several alternates as well as on the base plan. These alternates provided official legal budget adjusters and considerably facilitated the prompt award of contract, which speeded actual construction of the project.

How much would six more classrooms cost? What cost saving would result from omitting the auditorium? from building it as a shell only? In all, 21 such alternates, as priced in the bidding, are shown here in the analysis made of the results.

The re-appraisal turned out to be quite pleasant. Teaneck got its six additional classrooms and its auditorium too. It gave up some parking and flood lighting which can be done later.

The full details are presented in the accompanying tables.

The building contracts total $2,279,638. Furniture and equipment will add $108,000. This brings total unit costs, with equipment, to $1,900/pupil, $1.572/cu ft, and $20.87/sq ft. This also figures out at $82,333/standard classroom and $61,221/standard and special classroom.

These vital statistics show the size and capacity: cube, 1,518,533, floor area 114,414 sq ft, height, 1 and 2 stories, pupils, 1200.

The exterior is brick and limestone, aluminum windows and aluminum cornices. The frame is in part steel and in part reinforced concrete. Interior finish is painted slag block. Terrazzo floors are in corridors, locker rooms and toilets.

Section A has a cafeteria that seats 400, a kitchen, and a gymnasium with folding bleachers that seat 500. Both boys' and girls' locker rooms have radiand heat in floors. The locker rooms are provided with mechanically ventilated lockers. This section includes also a health education room.

Section B has three science rooms, a greenhouse, an art room and study halls on the second floor, industrial arts shop, a sewing room and a foods room on the first floor. The administration rooms to the right of the main entrance shown in the sketch are also located in Section B.

In Section C the auditorium seats 600. Here too are located a vocal music room in addition to an instrumental music room.

Section D houses the 29 classrooms.

The architect is Charles S. Cleveland, Hackensack, N. J.

Teaneck Road Junior High School

Final Contracts

Size	Total	%	%	Cost per Pupil 1,200	Cost per cu ft 1,518,533	Cost per sq ft 114,414
General Construction	$1,559,059	68.5	65.3	$1,300	$1.026	$13.63
Plumbing	124,117	5.4	5.2	103	0.082	4.08
Heating & Ventilating	235,275	10.3	9.9	196	0.155	2.06
Electric	256,152	11.2	10.7	213	0.169	2.24
Steel & Misc Iron Work	105,035	4.6	4.4	88	0.069	0.92
Total	$2,279,638	100.0	95.5	$1,900	$1.501	$19.93
Furniture & Equipment	108,000		4.5	90	0.071	0.94
Grand Total	$2,387,638		100.0	$1,990	$1.572	$20.87

Teaneck Road Junior High School (Continued)

Allowance for Furniture and Equipment

Industrial Arts Equipment	$18,000
Stage Curtains & Draperies	13,000
Home Economics Equipment	6,000
Auditorium Chairs	13,000
Cafeteria, Kitchen Equipment	58,000
Total	$108,000

Features Dropped, Substitutions & Saving

Visitors & Gymnasium parking	$13,503
Floodlighting	8,184
Glazed Cement for Clay Tile	3,028
Aluminum Intermed windows	1,702
Fiberglas for Acoustic Ceiling	13,950
Total	$40,367

General Contract (Bids 10-16-56)

	Joseph L. Muscarello, Inc.	Range of 5 Others
Base Bid	$1,640,000C	$1,719,500-1,817,000
Bid Bond	100,000	95,000- 100,000

Alternates—Additions

Add 6 classrooms	+59,242C	+60,600- 99,000
Use aluminum windows, awning type	+19,626	+13,500- 23,000
tempered glass	+13,950	+12,400- 14,000
steel stair rail instead of aluminum	+ 440	+ 390- 450

—Deductions

Build auditorium as a shell	−20,437	−21,000- 17,000
Omit auditorium	−88,782	−101,000- 75,000
Use wood instead of aluminum cornice	− 4,034	− 2,000- 275
Omit playfields	−29,093	−72,700- 20,500
Use 1/28" veneers instead of 1/8"	− 1,165	− 1,600- 900
Omit fencing	− 6,236	− 9,200- 5,700
Use glazed cement instead of clay tile in stair halls	− 3,028C	− 3,670- 2,700
Omit parking, visitor	− 6,121C	− 8,800- 5,300
gymnasium	− 7,382C	− 7,200- 5,000
Use aluminum intermediate windows	− 1,702C	− 5,700- 3,300
cement enamel finish for dado in hall	− 184	− 1,060- ±700
fiberglas ceilings instead of acoustic tile	−13,950C	−14,000- 9,400
Calendar days needed to complete	450	450-630

Plumbing

	William Zabransky, Jr. Inc.	Range of 3 Others
Base Bid	$124,117C	$126,543-143,971
Bid Bond	7,500	6,400-7,500

Alternates—Deductions

Build auditorium as shell	− 300	−1,965- 163
Omit auditorium	−7,100	−5,740-2,400

Heating & Ventilating

	Fred Wendel	Range of 2 Others
Base Bid	$228,564C	$229,935-244,180
Bid Bond	15,000	15,000- 12,300

Alternates—Additions

Add 6 classrooms	+ 6,711C	+ 6,721- 7,200
#6 oil	+ 2,571	+ nb- 1,800

—Deductions

Build auditorium as shell	−10,817	−12,954- 11,500
Omit auditorium	−11,220	−13,154- 11,890
Change controls to electric	− 8,880	− 9,100- 8,380

Electrical

	Badaracco Bros. & Co.	Range of 6 Others
Base Bid	$256,923C	$259,330-275,190
Bid Bond	15,000	15,000- 25,000

Alternates—Additions

Add 6 classrooms	+$7,413C	+$6,970- 8,491
Wired clock, tele & prog system	+ 360	+ 190- 560
Electric controls	+ 5,834	+ 5,850- 8,971

—Deductions

Build auditorium as shell	−14,746	−16,300- 13,500
Omit auditorium	−20,250	−22,780- 17,543
Omit flood lighting	− 8,184	− 8,200- 1,814

Structural Steel & Miscellaneous Metal

	Selback-Meyer Co.	Range of 5 Others
Base Bid	$104,435C	$108,522-127,900
Bid Bond	7,500	6,250- 10,000

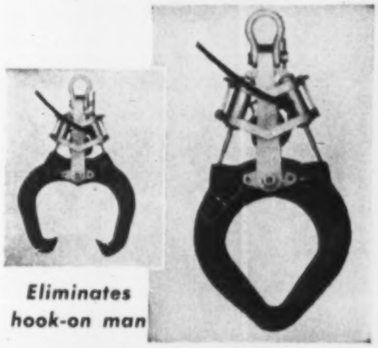
Alternates—Additions

Add 6 classrooms	+ 600C	+ 500- 1,463

—Deductions

Omit auditorium	−14,500	−19,000- 10,500
Use steel stair railings	− 5,400	− 8,000- 1,500

New power-operated
CRANE HOOK



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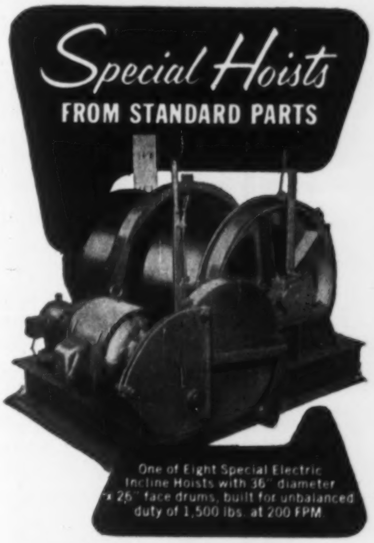

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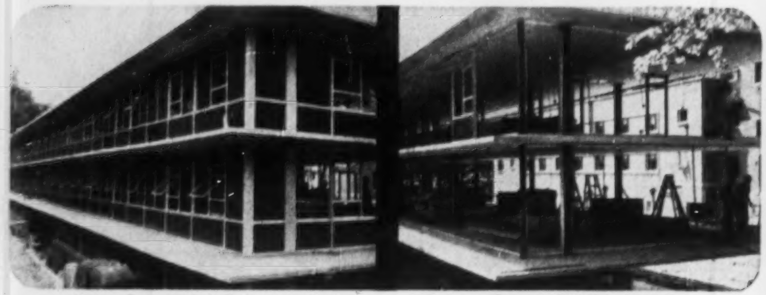
CURTAIN WALL SYSTEMS


After Curtain-Wall is installed. Before Curtain-Wall is installed.

—incorporating BAYLEY Projected Windows and Decorative Panels

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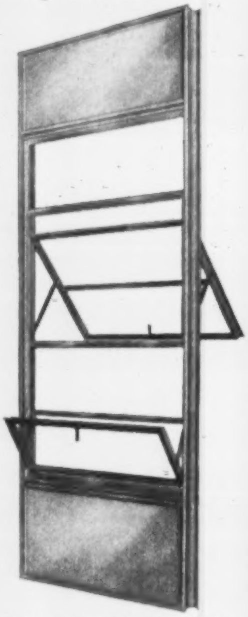
- ✓ **Permits a choice of decorative panels and individualized arrangements**
- ✓ **Provides an insulated wall treatment to suit the building's appropriation**
- ✓ **Designed to accommodate a building's movement — expansion and contraction**
- ✓ **Provision against condensation annoyance or damage**
- ✓ **A wall with any desired degree of air, light or vision**
- ✓ **Centralized responsibility for the complete wall system — including sub-frames, windows and panels**

For further information write; or call your local Bayley Representative; or see Sweets.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Springfield, Ohio

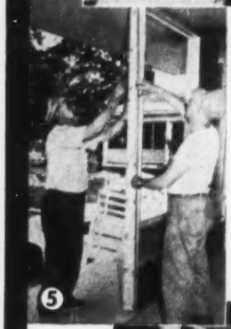
District Sales Offices: Springfield Chicago 2 New York 17 Washington 16

1. Bolting sill and header plate into position.

2. Bolting jamb plate to load-bearing column.

3. Interlocking window-panel into position.

4. Caulking interlock grooves before positioning mullion.



5. Positioning Bayley adjustable-width mullion.

6. Positioning window-panel — using interlock groove as slide.

School Costs Check Space Use

To pin down what school dollars are buying, the accompanying study of the distribution and use of space in five schools was made for a school planning committee headed by Mr. Grenville M. Read, chief engineer, E. I. duPont de Nemours and Company, Inc.

In Cecil County, Maryland, the Bainbridge elementary school cost $15.30 per square foot. It is a 1-story brick and window-panel building with roof supported by open-web joists and interior walls of painted concrete block. Floors are asphalt tile, ceilings are acoustic panels. Tile wainscot is used in corridor, kitchen and toilet rooms. Skylights are in class rooms, corridors and in the all purpose room. The architect is E. D. Finney & Assoc., Baltimore and the contractor is M & H General Contracting, Inc., Salisbury.

In Newcastle County, Delaware, the Carrcroft elementary school cost $15.53 per square foot. It was designed by Pope and Kruse, Wilmington, architects, and built by Rupert Construction Co. also of Wilmington, contractors. This is one and two stories with brick exterior, wood roof trusses and metal deck. Interior is painted brick, floors of asphalt tile, ceilings of acoustic tile and tile wainscot in toilets.

In Salem County, New Jersey, the J. T. Fenwick elementary school, cost $13.84 per square foot. It is one story with brick and window panel exterior. Roof is supported on open-web joists. The interior is painted Waylite block, floors asphalt tile, ceilings accoustic tile and tile wainscot in kitchen and toilet rooms. Architect is Hettal and Albert, Camden; contractor is Thomas Pagen, Inc., of Pennsauken, N. J.

The addition to Pennsville Memorial school in Salem County, New Jersey, which cost $18.43 per square foot was designed by Micklewright & Mountford of Trenton and built by Costanza Construction Co. of Pennsauken. It is one and two stories, brick exterior, painted plaster and concrete block interior, floors of asphalt tile, terrazzo and wood, acoustic tile ceilings and tile wainscot in corridors, kitchen and toilet rooms. The building is on piles. This addition raises the capacity of this school to 1,000 students, 29 classrooms. Special instruction rooms are provided for science, commercial, art, music.

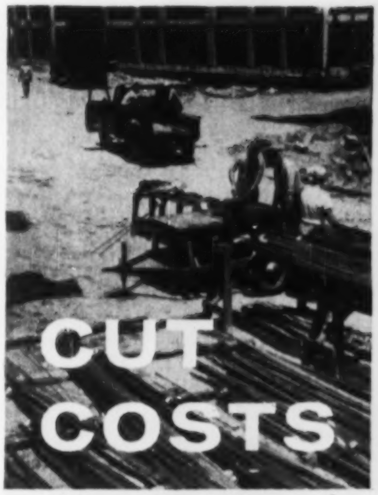
Octorara School in Chester County, Pennsylvania cost $16.30 per square foot. It is one and two stories, brick exterior, structural steel roof with metal deck, painted concrete block interior, asphalt tile floors, accoustic plaster ceilings, tile in toilet rooms. Special instruction rooms are: library, science, chemistry, Physics, commercial, art, homemaking, music, industrial shops, agriculture shops. Architects are Lawrie & Green, Harrisburg and contractors are Rice & Weidman, Lancaster.

School Cost and Space Analysis

Costs Include Fixed Equipment But Not Land Costs, Furnishings or Architect's Fee

		Elementary Schools						School Addition		High School	
		Cecil County Maryland 2-7-55		New Castle Co. Delaware 9-14-54		Salem County New Jersey 4-26-55		Salem County New Jersey 11-10-54		Chester County Pensylvania 9-1-54	
No. of students		540		400+540R		700		604 new—1,000 Tot		1,015	
Size/student	**sq ft**	64		126		62.8		139		118	
Cost/student	**$**	$978		$1,963		$869		$1,917.41		$1,800	
Total cost	**$**	$528,268		$785,133		$608,227		$1,158,119		$1,829,500	
per cu ft	**$**	$0.9175		$0.93		$0.87		$1.11		$0.74	
per sq ft	**$**	$15.30		$15.53		$13.84		$18.43		$16.30	
ENR aver/sq ft	**$**	$17.67		$17.67		$17.67		$16.31		$16.31	
Cubic feet, total	**cu ft**	575,660		842,952		695,000		1,041,200		2,500,000	
Area, total	**sq ft**	34,575	100%	50,548	100%	44,600	100%	62,800	100%	120,000	100%
Standard class rms	**sq ft**	17,640	51	14,550	29	22,800	51	7,400	12	14,343	12
Special instr rms	**sq ft**	1,250	4	3,300	7	1,900	4	18,800	30	25,200	21
Group activity rms	**sq ft**	4,400	13	12,250	24	3,400	8	21,100	19	31,400	26
Administration rms	**sq ft**	1,780	5	1,550	3	2,600	6	760	1	4,580	4
Service areas	**sq ft**	9,500	27	18,900	37	13,900	31	23,750	38	44,477	37
No of rooms:											
Standard class		18		14+6R		24		11 new—29 Tot		21	
size	**sq ft**	980		1,004		992		675		660	
shape	**lin ft**	28'x35'		26'3"x38'3"		25'x39'8"		22'6"x30'		22'6"x29'4"	
Special instruction		1—L		3—LMiMp		2—LAv		6—see text		10—see text	
Group activity		2—ApK		4—AGCK		2—ApK		3—ACK		4—AGCK	
Administration		4—OPTH		5—OPVHGs		5—OPFHTr		?—Gs, suite		6—OPHVSaTf	
Service—toilets, corridors, storage, plus BES		5—BE		6—BES		5—BE		5—ES		5—BS	
Finance		Fed Aid 90% County 10%		State 60% Distr 40%		Bond Issue at 2.75%		Bond Issue to repay in 10 yrs		Bond Issue to repay in 35 yrs just under 3%	

•A auditorium •Ap all purpose •Av audio visual room •B boiler room •C cafeteria •E entrance lobby •F conference room •G gymnasium •Gs guidance •H health •K kitchen •L library •Mi music instruction •Mp music practice •O general office •P principal's office •R designed so that more capacity can be added in future •S stairs •Sa student activity •T teachers lounge •Tr teachers rooms •Tf faculty room •V vault



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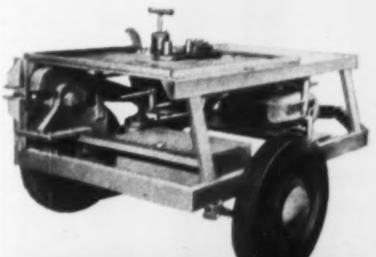


IRONMASTER

Midland Products Co.,
Midland Park, N. J., U. S. A.

The Swimming Pool Dollar

Pool Prices in Detail from Yakima, Washington

High ground water complicated one of the two identical swimming pools for which bid prices are shown here in unusual detail. These two swimming pools and bathhouses and two wading pools each in a different park are for Metropolitan Park District, Yakima County, Washington. Gray & Osborne, Yakima, are the consulting engineers.

The Lions Centennial Park pool and bathhouse are in a high-groundwater area that has to be completely de-watered by underground drains, but its twin in Washington Park is on a site with average conditions. Each pool is 50 ft x 120 ft with a diving ell of 40 ft x 42 ft off the deep end. Surrounding the pool in each case is 12,000 sq ft of sun deck. Each bathhouse is 35 ft x 140 ft. The pools are reinforced concrete and will have filtered and heated water. The bathhouses are built of clay block and will have built-up roofs. The cost differential between the two is $14,465, $178,771 for Lions Centennial Park, $164,306 for Washington Park, both awarded to Hans M. Skov of Yakima on low bids taken Aug. 7, 1956. The wading pools differ in shape, the rectangular pool will be in Larson Park and the oval pool in Milroy Park. De Blasio Bros. is the contractor for both. His low bid is $3,063 for the rectangular and $3,883 for the oval pool.

Wading Pool Milroy Park

1C	De Blasio Bros., Yakima, Washington	$3,883
2	Jensen-Rasmussen & Co., Sunnyside, Washington	4,380
4	Marwell Const. Co., Inc., Seattle 33, Washington	5,164

Bids: 8-7-56			Unit Prices	
Items	Unit	Quantity	1 C	2
Excav & bkfl, trench & struct, incl waste disposal	cy	275	$1 25	$2 00
Fndn & bedding grav	cy	35	4 00	3 00
Concrete	cy	40	45 00	40 00
Reinforcing steel	lb	1,650	0 18	0 15
Copper diaphragms, 12"	lf	75	2 00	1 55
Expansion jt, pool floor	lf	75	0 25	0 60
Met pipe, incl vlvs, fittgs & specials	ls	job	650 00	855 00
Conc sewer pipe, incl taps & Ys, 6"	lf	246	1 50	3 00
Washington State 3⅓ sales tax, omit excav & bkfl			114 16	123 56

Wading Pool Larson Park

1C	De Blasio Bros., Yakima, Wash	$3,063
2	Jensen, Rasmussen, Sunnyside, Wash	3,401
4	Marwell Const. Co., Inc., Seattle, Wash.	3,997

Bids: 8-7-56			Unit Prices	
Items	Unit	Quantity	1 C	2
Excav & bkfl, trench & incl waste disposal	cy	100	1 25	2 50
Fndn & bedding gravel	cy	38	4 00	3 00
Concrete	cy	38	45 00	40 00
Reinforcing steel	lb	2,450	0 18	0 15
Copper disphragms, 12"	lf	25	2 00	2 00
Expansion jt, pool floor	lf	25	0 25	1 00
Metal pipe, incl vlvs, fittgs, & specials	ls	job	385 00	775 00
Conc sewer pipe, incl taps & ys, 6"	lf	66	1.50	3.00
Washington State 3⅓ sales tax, omit excav & bkfl			94.78	101.65

To start: 8-13-56: To be completed: 6-1-57
Liquidated damages: $35 per day

Specifications require all class A to be 5.5-sack concrete to test at 2,000 pounds plus. Cast iron pipe is C1.150 Fed. Spec. WW-P-421. Steel pipe is ASTM-53 Sch 40 in sizes including 6-in., Sch 20 for sizes over 6-in.

Wage rates prevailing include: carpenters $2.80, iron workers $2.87, laborers $2.35, plumbers $3.10, cement finishers $2.95.

Both swimming pool contracts were awarded on the masonry-clay-block alternate and on the pool filter (with the sparkler alternate including accessories specified).

Close competition for the two swimming pools came in from four bidders. The low on Lions Park was only 0.6% under the second and only 1.5% under the high bid. On Washington Park swimming pool the low was 2.8 and 6.1% respectively under the second and high bids.

On the smaller pools the spread was greater between the four bidders. On the oval wading pool the low bidder was 11.5% under the second and 25% under the high bid and on the rectangular pool he was 10% under the second and 23.4% under the high bid.

Bidders include:

Swimming Pool & Bathhouse Washington Park

1C	Hans M. Skov Const. Co., Yakima, Wash	$164,306
2	Gilbert H. Moen, Yakima, Wash	169,029
4	Marwel Const Co., Seattle 33, Wash	175,050
EE	Gray E. Osborne, Consulting Engrs., Yakima, Wash.	170,000

Bids: 8-7-56 Items	Lump Sum Price	% of Total
Excav & bkfl, incl excess soil remov, 3.200 cy @ $1.00	$3,200 00	1.95
Fndn & bedding grav, 400 cy, @ $2.50	1,000 00	0.66
Conc, 600 cy, @ $49.00	29,400 00	17.89
Reinf stl, 81,500 lb, @ $0.145	11,817 50	7.18
Miscellaneous metals	6,600 00	4.00
Copper diaphragms, 6" 1,400 lf, @ $1.00	1,400 00	0.85
12", 430 lf, @ $1.80	774 00	0.47
Expansion jts, pool floor, 860 lf, @ $0.70	602 00	0.36
Masonry, cla bloc alternate *	3,700 00	2.24
Pool & filter room piping	22,578 00	13.73
Plumbing	12,102 00	7.36
Pool filter, sparkler alternate with accessories specified *	16,268 00	9.90
Electrical system, incl lighting	9,700 00	5.90
Chlorinator & accessories	1,564 00	0.95
Carpentry, millwork & hardware	12,900 00	7.84
Extra for tiled showers, optional with owner	800 00	0.48
Recirculation pump	963 00	0.58
Sump pump	191 00	0.11
Pool heaters	7,809 00	4.75
Shower water heating system	3,835 00	2.33
Ventilating system	910 00	0.55
Roofing	990 00	0.60
Painting	3,600 00	2.19
Fence, 425 lf, @ $4.90	2,082 50	1.26
Sewer pipe sealed jts 8", 105 lf, @ $2.00	210 00	0.12
MHs, complete, 1 ea, @ $100.00	100 00	0.06
Pool equipment	500 00	0.30
Bathhouse equipment	1,960 00	1.20
Flow meter	895 00	0.54
Chemical feeder	628 00	0.38
Washington State 3⅓ sales tax, omit excav & bkfl	5,197 96	3.33
* Alternates:		
Masonry, brokenface Shalex	3,550 00	....
Pool filter, Belco alternate, with accessories specified	13,708 00	....

To start: 8-13-56 To be completed: 6-1-57
Liquidated damages: $35 per day

Swimming Pool & Bathhouse Lion's Centennial

1C	Hans M. Skov Const. Co., Yakima, Washington	$178,771
2	Marwell Const Co., Inc., Seattle 33, Washington	179,886
4	Jensen-Rasmussen & Co., Sunnyside, Washington	181,540
EE	Gray E. Osborne, Consulting Engrs., Yakima, Washington	170,000

Bids: 8-7-56 Items	Lump Sum Price	% of Total
Excav & bkfl including excess soil remov, 4,650 cy @ $1.80	8,370 00	4.68
Foundation & bedding gravel, 400 cy, @ $2.50	1,000 00	0.56
Grav encasement for drain pipe, 70 cy, @ $3.00	210 00	0.11
Concrete, 615 cy @ $50.00	30,750 00	17.20
Reinf stl, 83,000 lb @ $0.15	12,450 00	6.96
Misc metals	6,900 00	3.85
Copper diaphragms, 6", 1,400 lf @ $1.00	1,400 00	0.78
12", 430 lf @ $1.90	817 00	0.45
Expansion jts, pool floor, 860 lf @ $0.70	602 00	0.33
Masonry cla bloc alternate *	3,750 00	2.09
Pool & filter room piping	24,024 00	13.43
Plumbing	15,102 00	8.44
Pool filter, sparkler alternate with accessories specified *	16,963 00	9.48
Electrical system, including lighting	9,700 00	5.42
Chlorinater & Accessories	1,555 00	0.87
Carpentry, Millwork, & Hardware	13,100 00	7.22
Extra for tiled showers, optional to owner	800 00	0.44
Recirculation pump	920 00	0.51
Sump pump	167 00	0.09
Pool heater	7,019 00	3.92
Shower water heating system	3,826 00	2.14
Ventilating system	910 00	0.51
Roofing	990 00	0.55
Painting	3,600 00	2.01
Fence, 440 lf @ $4.90	2,156 00	1.20
Sewer pipe, sealed jts, 8" 470 lf @ $2.00	940 00	0.52
Drain pipe, open jt, 8", 165 lf @ $1.70	280 50	0.15
MHs, complete, 5 ea @ $100.00	500 00	0.28
Catch basins, 3 ea @ $120.00	360 00	0.20
Pool equipment	500 00	0.28
Bathhouse equipment	1,990 00	1.11
Flow meter, S	1,019 00	0.56
Chemical feeder	604 00	0.33
Washington State 3⅓% Sales tax, omit excav & bkfl	5,496 00	3.33
* Alternates:		
Masonry, broken face Shalex	3,550 00	....
Pool filter, Belco alternate with accessories specified	13,708 00	....

To start: 8-13-56; To be completed 6-1-57
Liquidated damages: $35 per day

Replacement Pool Prices Include Demolition, Ohio

For its new more modern and spacious Junior Swimming Pool in Collins Park, Toledo, Ohio, is demolishing an existing pool. John H. Davis, Commissioner, Divisions of Engineering and Construction, is directing the work.

The new Junior Pool will be 100 ft by 50 ft with a depth of 2 to 4.5 ft. A companion wading pool will be 30 ft by 30 ft and one foot deep. The new filtration plant has a capacity of 120,000 gal.

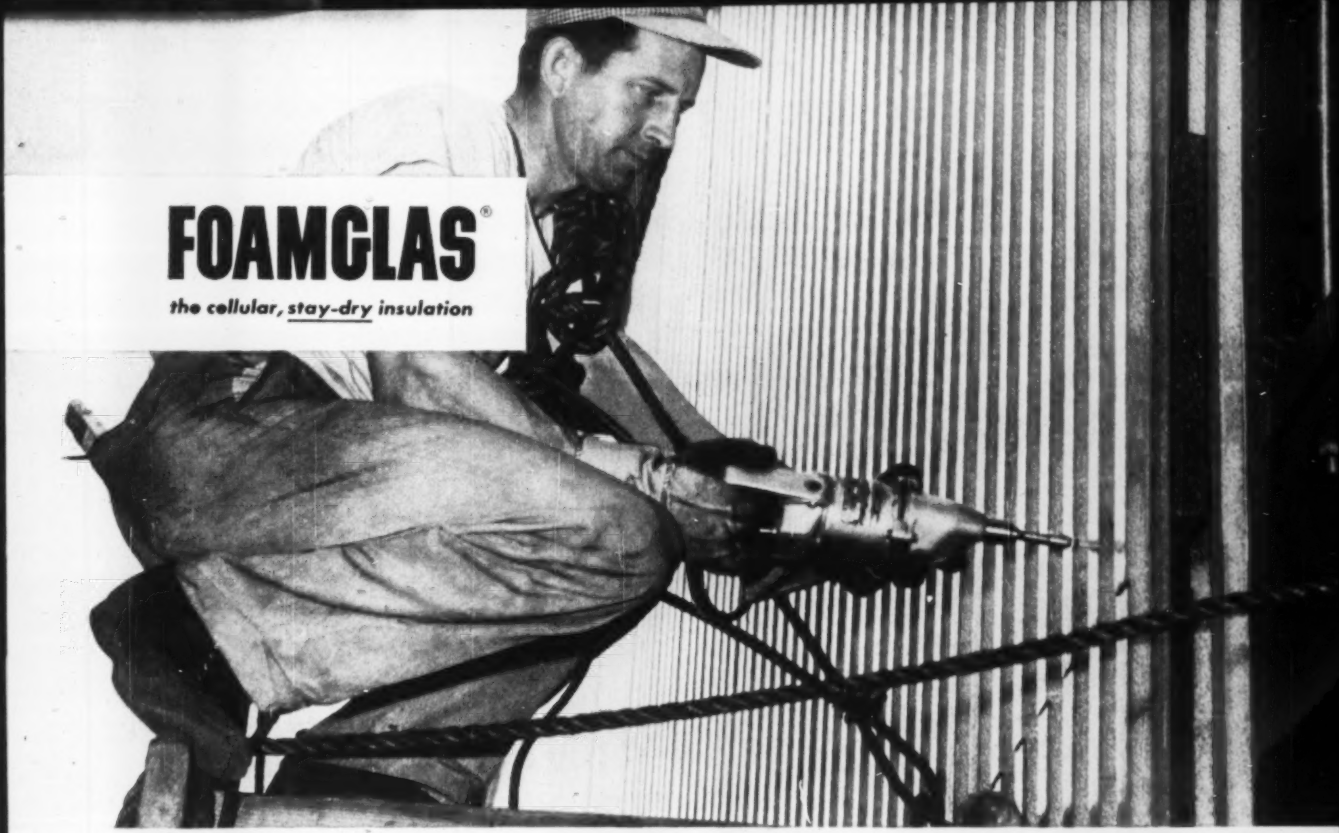
Two additions will be made to the existing bathhouse, one is 39.75 ft by 38 ft and the other is 35.75 ft by 25 ft.

Bidders were required to show materials and labor costs separately with 45.7% of the contract cost marked for labor.

Wages paid on Toledo include $3.40 plus $0.07 in fringe benefits for carpenters, reinforcing iron workers, plumbers and electricians and $2.52 plus $0.07 in fringe benefits for laborers.

The contractor, Ruch Construction Co. of Toledo, promised completion by Dec. 31, 1957 on work that is to get under way on Aug. 1.

Only two bidders competed for the complete job. The electrical work was awarded on a separate bid.



FOAMGLAS®

the cellular, stay-dry insulation

Duquesne Brewing's 3½" thick curtain wall was erected at job site. Ribbed aluminum back-up sheet was placed against supporting members and secured with drive screws. FOAMGLAS blocks were placed against back-up sheet and temporarily secured with adhesive. Ribbed aluminum facing sheet was then set in place and secured with self-tapping screws on 8" centers driven completely through facing sheet, FOAMGLAS and back-up sheet. Drilling through the FOAMGLAS did not impair its inherent moisture resistance.

At Duquesne Brewing Company's new bottling plant...

This FOAMGLAS insulated aluminum curtain wall went up fast—cost only $1.31 per square foot!

This ribbed aluminum curtain wall "sandwich"—insulated with a core of strong, moisture-proof FOAMGLAS—was erected faster than conventional walls at a cost of just $1.31 per square foot. The Duquesne Brewing Company of Pittsburgh, Pa., used it to build a new bottling plant designed and engineered by Peth and Reed, Pittsburgh.

Selection of FOAMGLAS as the core insulation was doubly important. First, its unusual strength, dimensional stability and rigidity helped make stronger wall panels—eliminated possible sagging or buckling after installation.

Most important, however, was the FOAMGLAS structure of minute glass cells, each a dead air insulating unit permanently sealed against moisture. Duquesne faced a possible condensation problem in the bottling plant walls. To solve it, the aluminum siding's ribs were designed to serve as small "chimneys" for condensation drainage. That meant moisture would drain across the surface of the core insulation. Only FOAMGLAS, being inherently moisture-proof, could serve under these conditions... and could be counted on for a constant insulation value for the life of the building.

Whatever *your* insulating problem, it will pay you to rely on FOAMGLAS for dependable, long-life insulating service. It's moisture-proof . . . inorganic . . . incombustible . . . dimensionally stable . . . strong and rigid . . . light in weight . . . acid-proof . . . vermin-proof. Prove these properties to yourself with six simple tests easily performed in your own office. Send for a FOAMGLAS sample and complete testing directions today. Address . . .

Future enlargement of the Duquesne Brewing bottling plant can be accomplished economically with aluminum-FOAMGLAS curtain wall. Existing wall can be removed, additional structural members erected and dismantled wall sections re-used to enclose expanded area.

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Willow growth clogging Mississippi drainage ditch . . .

. . . is killed by chemical spray

Drainage Ditches Cleared at Lower Costs

B. B. Hodgden
E. I. du Pont de Nemours & Co.
Wilmington, Del.

It cost $2,500 per mile in 1952 to hand-cut willow growth in an 11.9-mi stretch of drainage ditch in Washington County, Miss. Cutting regrowth two years later would have cost an estimated $800 per mile. Instead, a chemical spray was used, lowering the cost to $650 per mile. And a second spraying in 1956 cost only $258 per mile.

Thus did Austin B. Clinkscales, drainage engineer at Leland, Miss., install a low-cost method to clear—and keep clear—willow growth in 470 miles of drainage ditches.

• **Background**—The Bogue Phalia, Black Bayou and Riverside drainage districts serve 600 sq mi of Mississippi deltaland. The drainage ditches used —which eventually drain into the Yazoo River—handle drainage from several thousand acres of rice fields, as well as rainwater from the entire area.

The fertile soil and ample moisture along the ditches produce a clogging growth of willows and other brush. And the willows act as jetties that collect soil for still more growth. When Clinkscales came to Leland in 1952 to supervise operations for the three districts, nearly 80% of the channels were either partly or completely clogged by willow growth.

To clear and maintain the ditches in the conventional hand-cutting way would have required a crew and payroll so large it was out of the question.

• **Chemical solution**—Clinkscales checked with the Mississippi Levee Board and the Corps of Engineers, who had found a solution to similar problems in areas under their jurisdiction. They were using a chemical weed and brush killer trademarked "Ammate," made by E. I. du Pont de Nemours & Co.

Using the chemical, a half-mile section of Washington County ditch was test-sprayed in 1952. The effect was spectacular. A sprayer was bought and, in 1953, 80 miles of ditch were sprayed. The results established spraying as the replacement for hand-cutting.

The three districts now use a shop-built spray rig designed by Clinkscales. A 16-ft swinging boom mounted on a truck carrying the spraying machine allows an operator standing at its end to wield a spray gun that reaches brush up to 45 ft out. Where there were once three 25-man crews hand-cutting for nine months of the year, there is now one 5-man crew operating the sprayer plus a handful of men cutting the high growth. The spray crew covers a mile a day, or 125 miles a season.

Using the chemical-spray method, willow growth in a substantial portion of each district has been brought under control. In fact, Clinkscales has partly achieved the goal he had set—in the cleared sections, water levels are about 2 ft lower than in the uncleaned.

It is expected that spraying on a cycle of three to four seasons will ultimately result in complete control of willow growth in drainage ditches throughout the three districts.

Costs of spraying have averaged as low as $216 per mile for maintenance once the ditch had been cleared. Highest cost per mile was $653 for a ditch with 60- to 80-ft bottom and willows up to 20 ft. In this instance, the crew had to drag hoses through underbrush and do all spraying from the ground, instead of from the truck-mounted rig.

One consideration in adopting the chemical spray was the effect on nearby crops, especially cotton, the mainstay of the area. Care is taken to prevent any drift of the spray droplets, and the chemical does not give off any volatile fumes. To date, not a single case of crop damage has come up.

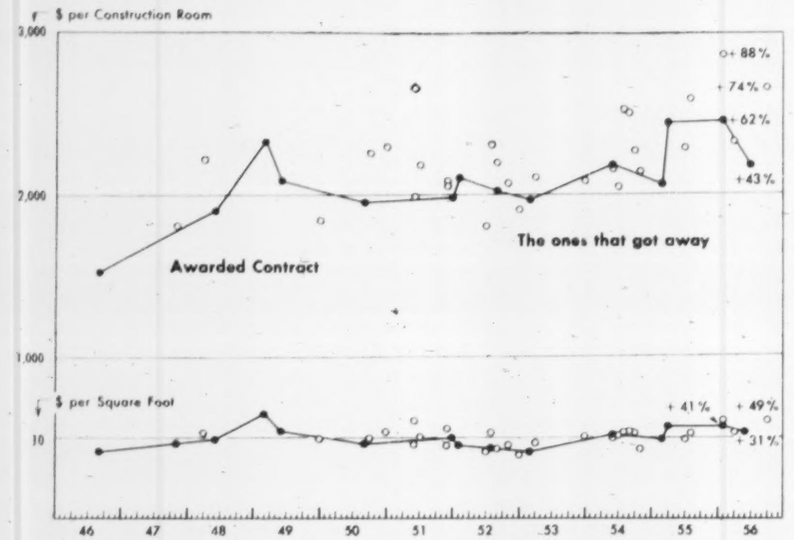
M-K Finds Air Transport Cheaper Method in Arctic

Morrison-Knudsen Co., Inc., is finding air transportation provides the answer for moving construction materials, equipment and supplies to the White Alice communications stations it is building in the Arctic as a subcontractor for the Western Electric Co.

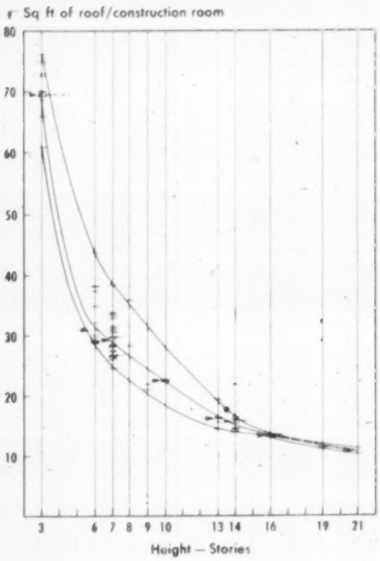
The company previously tried a combination of river barge and cross-country "cat train" but finds the materials can be flown in "a little cheaper," says Robert F. Peterson of Nome, Alaska, M-K manager for all White Alice construction. The main difference is in the elimination of rehandling and crating.

Thirty flights daily take off from Nome, weather permitting. Planes include twin-engine C-46s and DC-3s, single engine "bush" planes and four-engine military cargo planes.

Price Rise on Housing – Bids from August, 1946 to June 1956



Effect of Building Height on Roof Area per Construction Room



Construction-Room Is Key To Housing Bid-Price Check

Over $100 million worth of public housing contracts ago Geo. F. Driscoll Co., New York, set up standard bid analysis forms which produce a 3-way check on prices and price trends.

In addition to the usual cube and square foot costs the construction-room is priced as a unit. Vital statistics on size and characteristics of the construction-room for each typical floor, which yield data for rapid estimating and cost checking, are shown here along with the various influences on costs. On public work in New York the mechanicals are bid separately and not as part of the general contract, but they are included also in the accompanying analysis.

The pattern of the post war price rise is shown on the accompanying chart. In more detail the companion table I shows that with the size of the construction-room up 9% since 1946 the overall price is up 43%, the general contract is up 40%, plumbing 17%, heating 40%, electrical work 144% and elevators 134%. During this same period the ENR Building cost index has gone up 79%—the rise in materials prices and wage rates.

For another check on where the "Public Housing Dollar Goes" see Table II on Size of Buildings and Distribuution of Costs for the 14 projects covered by these reports. These represent $134 millions overall, $101 millions for foundations and structures and $33 millions for mechanicals. Note that the electric work took 4% in 1946 but over 6% in 1956, plumbing 12.8% in '46 and under 11% in '56, foundations and structures 74.7% in '46, close to 73% in '56.

In these 14 projects are 220 buildings ranging from 6 and 3 to 16 stories. Height produces the biggest variable in the vital statistics on the construction-room in the amount of roof area

I Cost Rise Analyzed

		8/46	1/56	% Chg	6/56	% Chg
Cost/construction-room		$1,524	$2,463	+62	$2,180	+43
/square foot		8.18	11.50	+41	10.706	+32
/cubic foot		0.788	1.238	+57	1.196	+52
Size/construction-room, sf		186.32	214	+15	204	+9
Cost-cr rise adj for incr in sf				+54		+39
ENR Building Cost Index		272.29	480.48	+76	488.70	+79
Foundations & General	**/cr**	$1,138	1,796	+58	1,593	+40
	/sf	6.11	8.39	+37	7.825	+28
	/cf	0.588	0.903	+54	0.874	+49
Plumbing	**/cr**	195.72	251.90	+29	229.09	+17
	/sf	1.05	1.18	+12	1.125	+7
	/cf	0.101	0.127	+26	0.126	+25
Heating	**/cr**	100.18	190.73	+90	140.29	+40
	/sf	0.54	0.89	+65	0.689	+28
	/cf	0.052	0.096	+85	0.077	+48
Electric	**/cr**	61.76	154.46	+150	150.97	+144
	/sf	0.33	0.72	+118	0.742	+125
	/cf	0.031	0.077	+148	0.083	+168
Elevators	**/cr**	28.34	69.22	+144	66.25	+134
	/sf	0.15	0.32	+113	0.325	+117
	/cf	0.014	0.035	+150	0.036	+147

II Size of Buildings and Distribution of Costs

$134,220,011 for 14 Projects

Date of Bids	Bldg Constr Total Cost	No of Bldgs	Height Stories	% of Total to Foundns & Genl	Plumb	Heat	Elect	Elev
8-13-46	$8,550,790	17/10	6&6/3a	74.7	12.8	6.6	4.0	1.9
5-20-48	10,812,409	20	6b	72.55	10.49	9.05	3.69	4.22
2-23-49	10,796,098	20	6	75.99	8.56	8.32	3.37	3.76
5-17-49	11,168,904	12/6	6/14c	75.20	9.01	7.82	3.67	4.30
8-15-50	5,681,655	2/3	13/14	78.60	8.56	7.32	3.58	1.94
12-19-51	5,831,355	11	7	73.07	8.34	10.07	5.85	2.67
1-18-52	7,732,189	7/6	14/3	73.36	8.97	9.92	5.43	2.32
8-22-52	10,640,440	26	7e	75.55	8.62	8.78	4.40	2.65
2-3-53	11,641,788	15	7	75.41	8.71	8.65	4.52	2.71
5-11-54	7,215,435	4/6	13/7	75.75	8.72	7.53	5.20	2.80
2-15-55	10,085,121	7/6	16x/7r	73.50	9.00	8.8	5.9	2.8
3-1-55	18,121,926	3/25	16/7bcdr	77.12	7.59	7.43	6.00	1.86
1-11-56	6,846,337	5	16r	72.90	10.20	7.70	6.30	2.90
6-5-56	9,095,564	7/2	16x/7r	73.08	10.51	6.44	6.93	3.04

a . . . plus management sujte and nursery or aged   b . . . on pjles   c . . . bojler house   d . . garage   e . . . 2 apartments   r . . . rectangular   x . . . cross charged against it. The chart shows how roof costs vary with height.

A check on the effect of height on unit prices is not so clear-cut and must be interpreted in relative values only. The accompanying table shows how prices on the higher building compare with those on the lower. Paired off are the closest comparable buildings available, a 13-14-story project compared with a 6-story, a 16- vs a 7-story and a 21- vs a 7-story. The time differential that clouds the picture is shown on Table III.

Of the two 1956 projects, one uses the rectangular form of building, the other uses the cross. Both are 16 stories high but the Mill Brook I project is larger than the Senator Wagner II project. However, the relative effect of the shape of the building on quantities per construction-room on typical floors is shown in Table IV.

The standard bid analysis forms that Geo. F. Driscoll Co. uses Table V, which has produced these comparative quantities and costs, follow with the recorded data on the successful bid on June 5, 1956 for Senator Robert F. Wagner Sr. Houses, Section II.

III Effect of Height on Unit Prices

Effect on cost/cu ft	% change higher building compared with lower		
	C	C	B
Number of stories	6-13/14	7-16	7-21
Time differential	1 yr 49-50	3 yr 53/56	1 yr 53/54
Total	+6.51	+31.1	+1.7
Foundns & Struct	+12.12	+27.0	+5.6
Plumbing	−2.4	+54.9	−8.6
Heating	−2.8	+17.1	−31.8
Electric	0.	+79.1	+16.7
Elevators	−51.3	+34.6	+32.3
Cost/sq ft			
Total	−13.6	+39.1	+6.7
Foundns & Struct	−9.7	+34.5	+10.8
Plumbing	−18.7	+63.9	−4.2
Heating	−18.9	+23.6	−28.7
Electric	−14.6	+94.6	+22.5
Elevators	−60.7	+45.5	+37.7
Cost/cr—construction room			
Total	−6.09	+24.5	+2.6
Foundns & Struct	−0.25	+20.5	+6.5
Plumbing	−9.3	+46.2	−7.9
Heating	−30.3	+11.4	−31.5
Electric	−6.8	+72.7	+17.7
Elevators	−56.9	+29.1	+32.1

C Contract prices B Bid—not low bid

IV Effect of Shape of Building on Unit Quantities

		Mill Brook Houses I		Sen. Robert F. Wagner Section II		Quantities in Cross as % of Rectangle
Height		5/16-story		7/16-story		
Shape		Rectangle		Cross		
		sf	%	sf	%	%
Space, rental		7039	87.88	6166	89.45	87.60
public		970	12.12	670	10.55	69.07
Total		8009	100.00	6836	100.00	85.38
No. of: Contr. rooms		37		34		91.9
Rent rooms		41½		38		91.6
Typical Floor—Quantities per Construction Room						
Walls, perim.	lf	13.67		13.97		102.19
area	sf	117.59		118.76		100.99
windows	ea	1.21		1.23		101.65
Partitions	lf	25.67		29.85		116.28
Public halls	lf	7.02		6.32		90.03
Space, rental	sf	190.00		181.35		95.45
public	sf	26.21		19.70		75.16
Roof		13.52		13.09		96.82
Bath		.24		.24		100.00
Kitchen		.24		.24		100.00
Elevator		2E to 4½A		2E to 4A		

V Bid Price Analysis Forms

Bid Date: *June 5, 1956*
W.J.M.

Project Name: *Senator Robert F. Wagner Sr. Houses—Section II*
Location: *Between 1st & 2nd Aves., East 121st St. to 124th St., Bronx, N.Y.*
Owner: *New York City Housing Authority*
Address: *299 Broadway, New York 7, N.Y.*
Architect: *Starrett & Van Vleck, Architects—Reginald E. Marsh, Associate*
Structural Engineer: *Seelye, Stevenson, Value & Knecht*
Mechanical Engineer: *Meyer, Strong & Jones*
Landscape Architect: *Clarke, Rapuano & Holleran*

Description of Project (State number, type and number of stories in buildings.)

7 Buildings—Form of Cross, 16 stories each
2 Buildings—Oblong, 7 stories each

Construction Costs (Bid or Contract Price):	*$9,095,564.00*		$	Total
Foundations & Genl Contr.	*$6,647,664*	*73.08%*	$	$
Plumbing	$ *956,000*	*10.51%*	$	$
Heating	$ *585,420*	*6.44%*	$	$
Electric	$ *630,000*	*6.93%*	$	$
Elevators	$ *276,480*	*3.04%*	$	$
Total Building Constr. Cost	*$9,095,564*	*100.00%*	$	$
Site Improvement	$			
Landscaping	$			
Total Development Cost	$			

Coverage: Land Area .... **S.F. Bldg. Area** .... **S.F**
Coverage .... **%**

Layout:

Type Apt.	No.	%	Rental Rooms	Contr. Rooms	Room Sizes LR	DA	B1	B2	B3	B4	K	Bath
3	*61*	*6.2*	*213½*	*183*	*180*	...	*133*	...	...	...	*60*	*35*
4	*658*	*66.8*	*2961*	*2632*	*171*	...	*130*	*117*	...	...	*108*	*35*
5	*238*	*24.2*	*1309*	*1190*	*172*	...	*132*	*116*	*116*	...	*115*	*35*
6	*28*	*2.8*	*182*	*168*	*232*	...	*121*	*121*	*117*	*119*	*139*	*35*
Total	*985*	*100*	*4665½*	*4173*								

Stores: No. .... **Sq. Ft.** .... **Frontage** .... **Cubage** ....

Garage Facilities: No. Cars .... **Size & Type** .... **Parking Spaces** .... **Cubage** ....

Technical Data: (General)

A.I.A. Cubage	*7,606,440*	**Story Height**	*8'6"*
Rental Area	*849,520*	**Rental Area (net)**	*766,220*
S.F. per Contr. Rm (gr.)	*204*	**C.F. per Constr. Rm.(gr.)**	*1,823*

Unit Cost:

Construction Cost Breakdown	**Cu. Ft.**	**Sq. Ft.**	**Contrs. Rm.**	**Rental Rm.**
Foundation				
Genl Constr.	$ *.874*	$ *7.825*	*$1593.02*	*$1425.01*
Plumbing Work	$ *.126*	$ *1.125*	$ *229.09*	$ *204.93*
Heating Work	$ *.077*	$ *0.689*	$ *140.29*	$ *125.49*
Electrical Work	$ *.083*	$ *0.742*	$ *150.97*	$ *135.05*
Elevators	$ *.036*	$ *0.325*	$ *66.25*	$ *59.27*
Total Building Costs	*$1.196*	*$10.706*	*$2179.62*	*$19.4975*
Site Improvement	$	$	$	$
Landscaping	$	$	$	$
Total Development Cost	$	$	$	$

Typical Floor: Building Type: (*Cross*—**16** *stories*)

Sq. Ft. Rental Space	*6166*	*89.45%*
Sq. Ft. Public Space	*670*	*10.55%*
Sq. Ft. Total Space	*6836*	*100.00%*

Schedule of Apartments:		**Constr. Rooms**	**Rental Rooms**
4	*6*	*24*	*27*
5	*2*	*10*	*11*
Total	*8*	*34*	*38*

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V Bid Price Analysis Forms (Continued)

The following is based on quantity per construction room:

Total			**per Constr. Room**
475	**Exterior Walls, Perimeter**	**lf**	*13.97*
4038	**Area**	**sf**	*118.76*
42	**Windows**	#	*1.23*
1015	**Partitions**	**lf**	*29.85*
215	**Public Hall Walls**	**lf**	*6.32*
6166	**Rental Space**	**sf**	*181.35*
670	**Public Space**	**sf**	*19.70*
6836/16	**Roof Area**	**sf**	*13.09*
10	**Bathrooms**	#	*0.24*
10	**Kitchens**	#	*0.24*
2	**Elevators** *4*	**Apts. per Elev.**	

Typical Floor: Building Type (*Rectangular—7 stories*)

Sq. Ft. Rental Space	*5402*	*89.43%*
Sq. Ft. Public Space	*590*	*10.57%*
Sq. Ft. Total Space	*5992*	*100.00%*

Schedule of Apartments:		**Constr. Rooms**	**Rental Rooms**
3	*4*	*12*	*14*
4	*2*	*8*	*9*
5	*2*	*10*	*11*
Total	*8*	*30*	*34.*

The following is based on quantity per construction room:

Total			**Per Constr. Room**
405	**Exterior Walls, Perimeter**	**lf**	*13.50*
3443	**Area**	**sf**	*114.76*
38	**Windows**	#	*1.27*
928	**Partitions**	**lf**	*30.93*
180	**Public Hall walls**	**lf**	*6.00*
5402	**Rental Space**	**sf**	*180.06*
590	**Public Space**	**sf**	*19.67*
5992/7	**Roof Area**	**sf**	*29.80*
8	**Bathrooms**	#	*0.27*
8	**Kitchens**	#	*0.27*
1	**Elevators** *8*	**Apts. per Elev.**	

Fringe Labor Costs Studied

Total fringe labor costs account for 12% of the construction payroll, for 16% of the total private industry payroll and for 21% of government payrolls.

These benefits cost $36 billion in 1955 as estimated by the Chamber of Commerce of U. S. A., which amounts to an average of approximately 17% of the national payroll.

These are the classes of benefits covered in this study:

Fringe benefit	% of Payroll
Legally required	3.3
Pensions, insurance, agreed	3.6
Rest periods	3.0
Vacations, holidays, sick leave other time not worked	5.9
Bonuses, profit sharing, misc	1.2
Total	17.0

The fringe costs above cover payments in time as well as in money. Analysis of supplements to wages and salaries shows how these have increased since 1929 and how construction workers benefit in ratio to other industry workers.

Total Suplements as % of Wages & Salaries

	Contract construction	Mining	Private all Industry	Incl. all, Government
1929	2.3	1.6	1.1	1.3
1935	3.4	1.7	1.4	1.8
1940	6.6	5.7	4.8	4.6
1945	5.3	4.1	4.5	4.8
1950	5.0	8.9	5.3	5.3
1953	4.9	9.3	5.7	5.5
1955	5.5	10.0	6.3	6.1

In 1955 almost $13 billion went into supplements to wages and salaries as reported by the U. S. Department of Commerce.

These payments to employees are in these areas:

Employer contributions: To social insurance	45.5%
To private pension & welfare funds	41.5
Compensation for injuries	8.1
Other	4.9

This analysis is from "Fringe Benefits 1955," a research study by the Economic Research Department, Chamber of Commerce of the United States.

tt
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Five years ago, the generally accepted practice among engineers and contractors was to weld non-critical pipe larger than 2-inches and thread the smaller sizes. Today, that dividing line has gone down; much piping as small as ½-inch is now being welded. In small piping as in large, the big reason for welding is *to save money* . . . in installation cost, in material cost, in maintenance cost. See next page for typical results. For the small pipe jobs, too, you get the *most for your money* when you specify and buy TUBE-TURN* Welding Fittings and Flanges. Your nearby Tube Turns' Distributor can give you speedy service in sizes from ½-inch to 42 inches!

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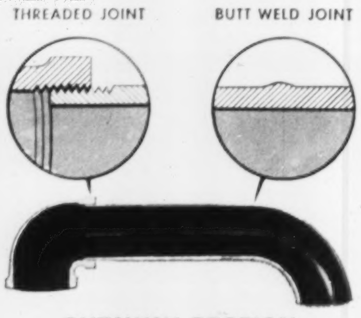
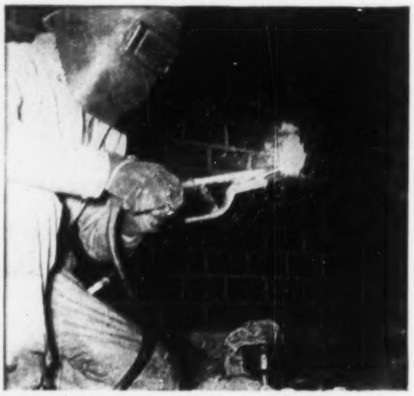
NEVER LEAKS. Welded joints are permanently as strong and leakproof as the pipe itself. Photo shows welded lube oil lines for one of four diesel engines, replacing threaded lines which leaked. If welded in first place, would have saved $4000 replacement cost. Pipe is 2½" with TUBE-TURN Fittings.



CUTAWAY SECTION
OF 2" SCHED. 40 PIPE

SAVES MATERIAL. Threading cuts half of pipe wall away as shown. The welded joint is as strong as the pipe. An installation of Schedule 40 pipe, welded, is stronger than Schedule 80 threaded. Hence, for equal strength welded piping can cut material costs 30-50%.



TAKES LESS TIME to weld than to thread pipe above 2" and about equal time for smaller sizes, according to recent tests on hundreds of joints made by many different pipe fitters. Welded joints in 1½" piping such as the school heating line shown, averaged 7 minutes compared to 8 minutes for threading and tightening fitting.

IS COMPACT, NEAT. This installation of 1½" and 2" boiler blow-off piping shows ability to nest welded lines close together for better layout and streamlined appearance. Also, insulation, where needed, is easier to apply.

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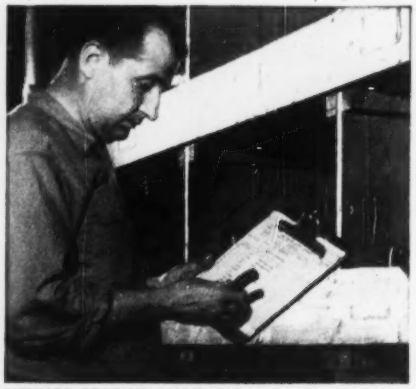

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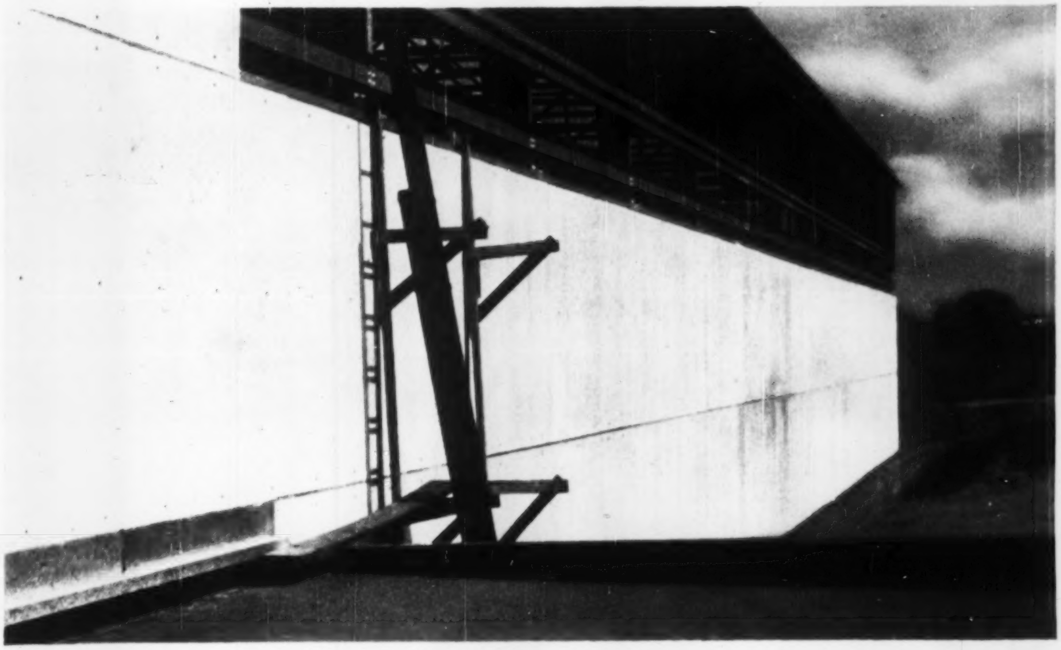

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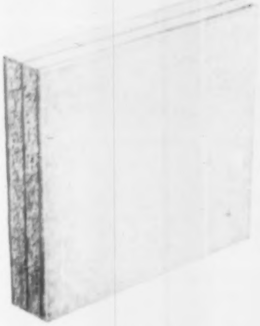
THE MOST striking change in building construction methods in recent years has been the trend toward prefabricated building panels.

This is particularly true in the construction of panelized curtain walls for buildings, large and small. Although curtain wall construction in skyscrapers has been widely publicized, this method of construction is just as applicable to smaller buildings such as schools, hospitals, office buildings, motels and shopping centers. Today, paneled curtain walls probably exceed all other applications in popularity and are rapidly becoming the standard method of building construction.

Johns-Manville Transitop offers architects, designers and builders a simple and economical method of providing panelized curtain walls. Transitop is durable, weather resistant, requires minimum maintenance. As a curtain wall, Transitop provides high structural strength, reduces the dead load, increases usable floor space, provides adequate insulation and is easy to erect. Panels are easily applied over wood or steel framing.

The same advantages that make Transitop so suitable for panelized curtain wall construction also make it equally ideal for roof deck construction.

J-M Transitop is a complete 4′ wide by 8′, 9′, 10′, or 12′ long unit, in 11/16″, 1⅛″, 1 9/16″, or 2″ thicknesses. It consists of an integral impregnated insulating board core faced on two sides with Asbestos Flexboard® sheets.



- Facings of tough, weatherproof asbestos-cement Flexboard
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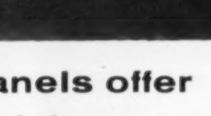

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CRITICAL FACILITY BUILDING of a nuclear research laboratory at Pawling, N. Y. includes the reactor room (high section in background) and a low wing of offices, shops and darkrooms.

Nuclear Research Facility Features Low-Cost Shielding

Robert F. Borg
Vice President-General Manager
Kreisler-Borg Construction Co.,
White Plains, N. Y.

Shielding, always a problem in nuclear installations, was kept to a minimum cost in what is believed to be the nation's first privately financed commercial laboratory for nuclear research by using natural materials afforded by the site wherever possible.

Thus the reactor room of the so-called critical facility building is shielded on three sides by hills, while on its fourth side a 4-ft-thick solid concrete wall, 60 ft long, is used. But again, for purposes of economy, this wall is only carried up to the height of the adjacent laboratory wing, the reactor room wall above this height being merely concrete-filled 12-in. concrete block. While not an absolute safeguard, these blocks, through their mass, reduce the effect of stray radiation passing through the upper half of the building.

However, radiation particles, escaping through the metal roof deck of the reactor room, are liable to hit the ionosphere in their upward path and be deflected downward, so that a ponded roof of 4 in. of water was placed atop the lower adjacent laboratories, which also provide shops and offices.

"Hot" capsules containing radioactive materials received by the laboratories are shielded by storing them in pipes varying in diameter from 4 in. to 8 ft. The 8-ft-dia pipe is sunk vertically in solid rock, while the smaller pipes (located in another building, the hot laboratory) are laid horizontally in a unique storage wall, and then covered with six feet of radiation-proof earth fill. Decontamination pits also are sunk into the natural rock, which gives them a natural shielding.

The owner of this new laboratory is the Nuclear Development Corporation of America (NDA), which in eight years has grown from four to 300 employees and outgrown successive quarters in different locations in White Plains, N. Y. Its new installation is on a 1,200-acre site near Pawling, N. Y., 60 miles north of New York City, where there is room for unlimited expansion in research experiments on fissionable materials. While completing preliminary designs, NDA called in Kreisler-Borg Construction Co., White Plains, to undertake construction of the first phase, which included the critical facility building and a hot laboratory building.

• Site selection—Collaboration with the contractor offered the owner-designers a chance to keep the preliminary design of the critical facility building free from being pin-pointed in any particular location at the site. With 1,200 acres to choose from, the various choices were narrowed by accessibility, swamp, or hilliness to three, and, finally, to a single choice.

The final site, besides giving the desired orientation with respect to the mountains, also dropped down sharply at the shield wall in the reactor room. Since the location was practically solid rock, this gave an important saving in construction costs by eliminating a great deal of rock blasting for the pits and storage pipes. At the same time, the space between the pit bottom in the reactor room and the laboratory wing would present a path of solid rock to block any radiation underground.

• Site dictates design changes—The 4-ft-thick shield in the critical facility building originally was designed to be a steel frame enclosed in steel panels to serve as a container for gravel fill, of which there is an abundance near the site. But it was decided that the moisture content of the gravel would be too difficult to control, thus affecting its

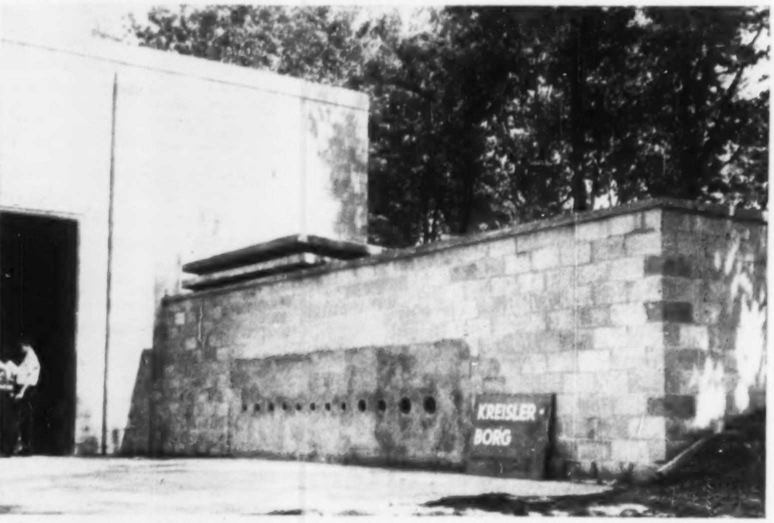
Unit Costs of Nuclear Research Lab

Item	Critical Facility	Hot Laboratory
Concrete 3,000 psi, air-entrained, stone aggregate	$59.00/cu yd	$59.00/cu yd
Concrete filled 12 in. concrete block	1.50/sq ft	1.50/sq ft
Concrete filled 10 in. concrete block	1.30/sq ft	1.30/sq ft
Ponded roof—steel deck and 5-ply builtup roofing with insulation	1.35/sq ft	......
Storage pipes in rock, 8-ft dia	120.00/lin ft	......
Storage pipes in earth with 6 ft of cover		
8-in. dia	......	8.00/lin ft
6-in. dia	......	7.00/lin ft
4-in. dia	......	5.50/lin ft
Excavation, earth	1.25/cu yd	1.20/cu yd
Excavation, rock	25.00/cu yd	25.00/cu yd
Gravel fill	1.15/cu yd	1.15/cu yd
Reinforcing rods	.25/lb	.25/lb
Concrete block, 12 in.	1.30/sq ft	1.30/sq ft
10 in.	1.10/sq ft	1.10/sq ft
8 in.	1.00/sq ft	1.00/sq ft
4 in.	.80/sq ft	.80/sq ft
Structural steel	400.00/ton	......
Steel roof joists	406.00/ton	370.00/ton
Gypsum plank roof deck and 5-ply builtup roof with 2-in. insulation	......	1.42/sq ft
Windows and glazing	50.00 ea	47.00 ea
Metal partitions	110.00 ea	110.00 ea
Rolling steel doors	360.00 ea	......
Vault door	350.00 ea	......

mass and shielding properties. The wall then was redesigned in concrete, and a 3,000 psi, 28-day mix using air entrained cement and utilizing a maximum of ¾-in. stone with a 4-in. maximum slump was used. The effect of air entrainment was found to be negligible on the concrete's shielding properties.

Again, the contractor advised that blasting rock to install the foundations would be more costly than raising the entire site with gravel fill, so the floor grade was raised two ft, and approximately 2,800 cu yd of gravel was brought in later to accomplish this pur-

(*Continued on page 298*)



STORAGE WALL of the hot laboratory building includes pipes from 4 to 8 in. in dia which is covered over with six feet of earthfill. The shielding that has been provided is sufficient for the safe storage of hot components.

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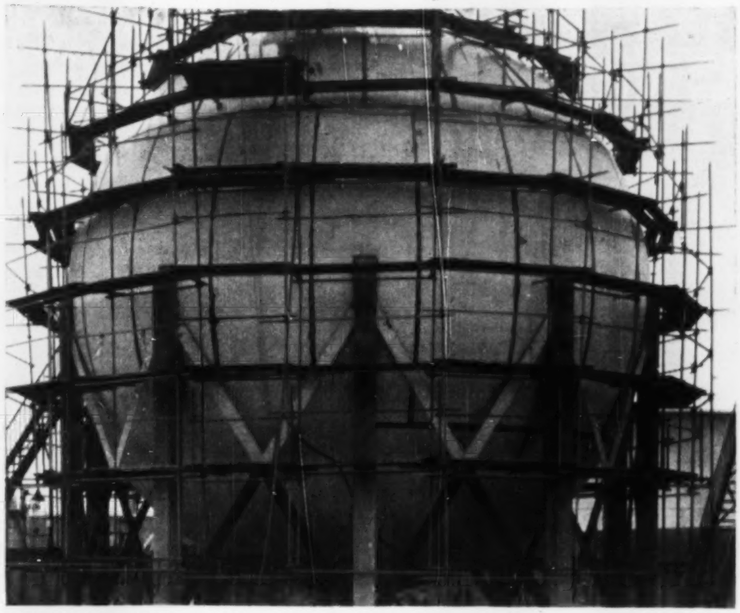

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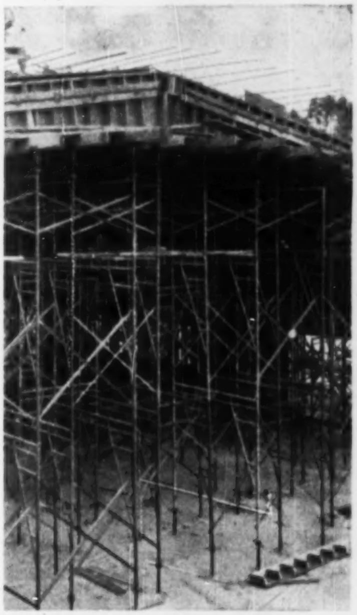
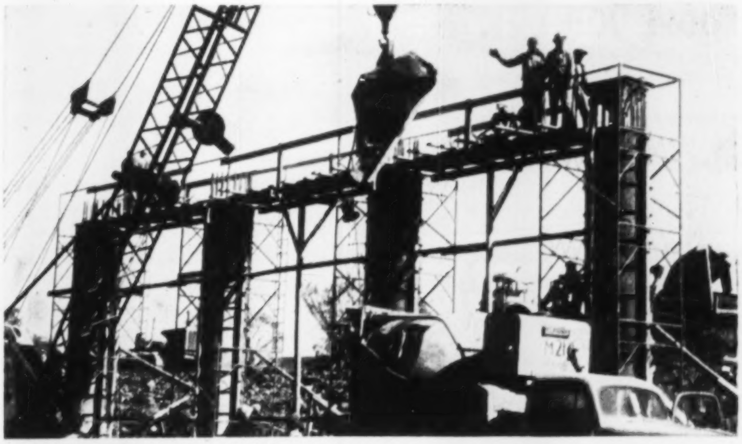


HEAVY LOAD—"Trouble Saver" Sectional Shoring frames, on 2' 6" centers, speed work on Mess Hall, Marine Corps Base, El Toro, Calif. Heavy, high-arched 62' beam varied from 2' 2" to 3' 6" deep by 1' 6" wide. Allison Honer Co., gen. contr.



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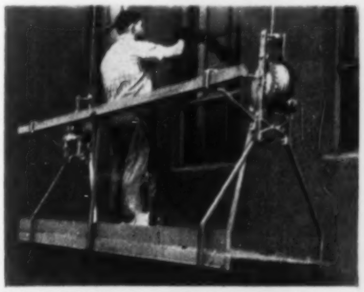

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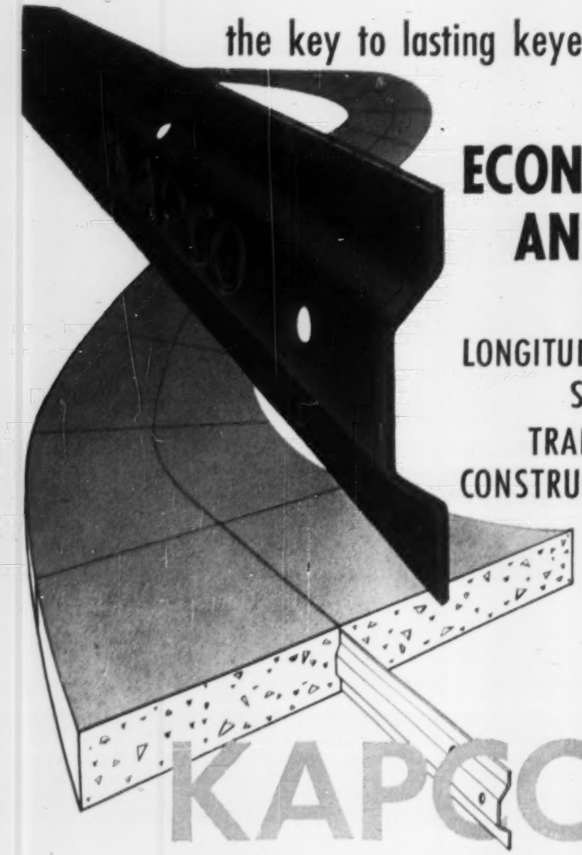

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KAP

A Division of AMERICAN-MARIETTA COMPANY
3784 CHOUTEAU AVENUE, ST. LOUIS 10, MISSOURI • 101 EAST ONTARIO STREET, CHICAGO 11, ILLINOIS

pose. Savings in the foundation and shield wall height more than offset the cost.

The building had been designed to rest on a spread footing with concrete walls, but after consultation with the contractor a grade beam design with piers resting on the outcropping rock saved many yards of concrete foundations.

Even the huge shield wall was set on five piers designed to rest on rock at various locations.

The building consists of the reactor room, 61x30 ft with a 38-ft clear height, and a laboratory, office and shop wing, 61x61 ft with an 11-ft clear height. The walls are 10- and 12-in. concrete block supporting steel joists, with a separate steel frame for the reactor room. Roof construction consists of steel deck with 2-in. insulation and 5-ply built-up gravel roofing.

• **Hot laboratory**—Midway during foundation work on the critical facility building, the plans were completed for the hot laboratory building, and the contractors were notified to give it top priority.

Work therefore was rushed on this second building, so that it was completed approximately a month and a half ahead of the first.

The hot laboratory is an "L" shaped building with concrete block walls, steel bar joists supporting a 2-in. gypsum plant roof deck that is covered over with 2-in. insulation and 5-ply built-up roofing.

The unit contains a "cave room" wing 46x70 ft with a 20-ft clear height, and offices, shops, and darkroom that are located in a wing 40x50 ft with 11-ft clear height.

The storage wall together with its earth-covered pipes extend out from the cave room.

• **Cost**—Unit costs are given in the accompanying table, other costs were as follows: The critical facility building cost $16.10 per sq ft including the reactor room with its 38-ft clear ceiling, shielding, and plumbing and electric facilities. The cube price was $0.57 per cu ft.

The hot laboratory with its 20-ft-high cave room ran $10.40 per sq ft, or $0.64 per cu ft.

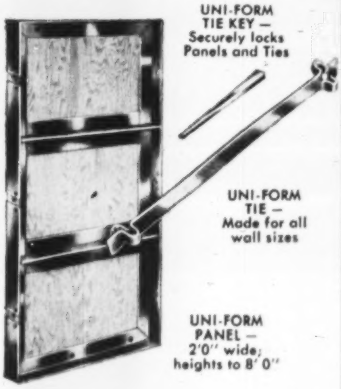
For NDA, design was under direction of John Menke, president. Katchik O. Donelian served as project leader; Dumont Rush, project engineer; Fred Welsh, chief architect; Richard Ryan, resident engineer; and Arnold Zais, business manager.

Serving Krisler-Borg were Jacques Krisler, Jr. and Robert F. Borg, project managers; Tom Grasso, general superintendent; and Dan Goulet, superintendent.

UNI-FORM

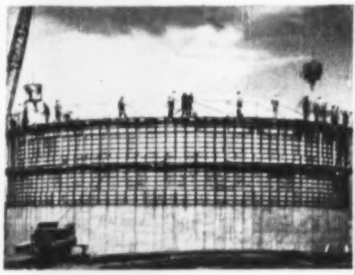
Concrete Forms

3 SIMPLE ELEMENTS FORM ANY CONCRETE STRUCTURE


UNI-FORM TIE KEY — Securely locks Panels and Ties
UNI-FORM TIE — Made for all wall sizes
UNI-FORM PANEL — 2'0" wide; heights to 8'0"

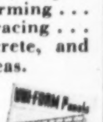
UNI-FORM Concrete Forms are prefabricated steel-framed, plywood faced panels . . . ready to use when they reach the job.
UNI-FORM Ties and Keys lock and spread Panels into an automatically accurate form. No measuring — no guesswork. Completely versatile . . . they form straight, battered, circular, irregular or curved walls at lowest all around cost.

Rented . . . Sold . . .
Rented With Purchase Option



HIGH SPEED CIRCULAR WALL FORMING

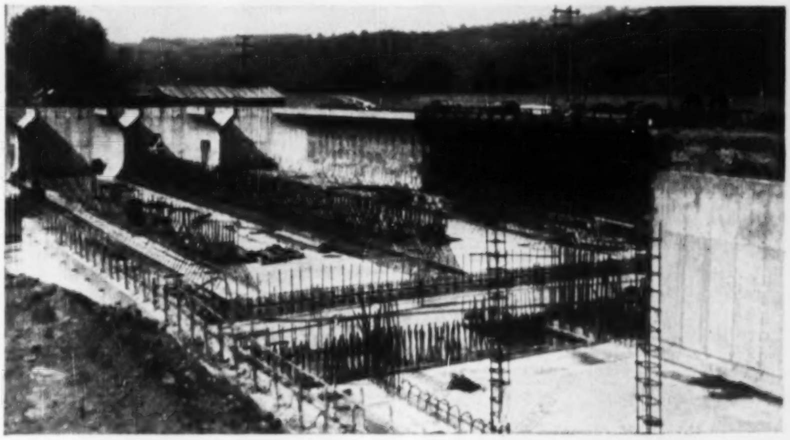
UNI-FORMS provide faster, simpler and easier circular wall forming . . . one side alignment and bracing . . . absolute control of concrete, and safer, cleaner working areas.



Write for the UNI-FORM Catalog and complete details

UNIVERSAL
FORM CLAMP CO.
1238 N Kostner Ave
Chicago 51, Illinois

Unique Prefab Form System Speeds Sewage Plant "Y" Wall Construction



MECHANIZED FORMING with new "Y" wall trusses and UNI-FORM Panels speeds construction, saves labor and material

Field reports on a new system for forming "Y" walls in aeration tanks and settling basins indicate very satisfactory operation and important labor and material saving advantages for the system.

Developed by the Universal Form Clamp Co., Chicago, the new system is said to completely eliminate the many problems and difficulties encountered by contractors in forming this special type of wall in sewage disposal plant construction.

Specially designed trusses, which can be made to handle any type, height, shape or wall thickness, are used in conjunction with standard UNI-FORM Concrete Forms to form the "Y" wall. Assembly of the truss and UNI-FORM Panels into a complete form, ready to receive concrete is a fast, mechanical operation. Positive internal spreading and accurate wall thicknesses are assured by the use of Universal Spiroloc Cone Nut Assemblies.

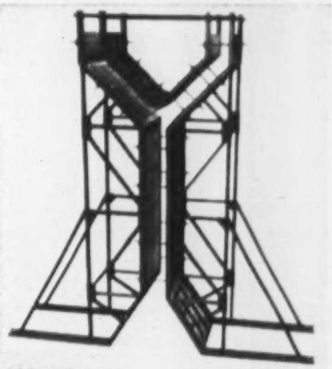
Features incorporated in the design and operation of the Universal "Y" wall forming system eliminate the necessity of additional lumber or tying devices for the alignment and bracing of the unit.

STRIPPED WALLS are clean and accurate

Erection, stripping and movement of the form can be handled either as individual pieces or as a large unit. Both methods have been very successfully used on recent projects.

Because standard UNI-FORM panels are used to form a large percentage of the "Y" wall contact area, it is possible to strip all UNI-FORM panels within a very short time after the actual pouring of concrete, leaving the trusses in place to provide the necessary support for the required period of time.

In this way, faster forming cycles, using minimum UNI-FORM equipment are possible, resulting in lower labor and material costs. UNI-FORM Panels are rented or sold, or rented with an option to purchase.



ASSEMBLED SECTION of "Y" wall truss with UNI-FORM Panels

For complete details on Universal "Y" wall forms and UNI-FORM Panels, Write:

UNIVERSAL FORM CLAMP CO.
1238 North Kostner Avenue
Chicago 51, Illinois
Distributors and Branches in Principal Cities

ALL NEW DESIGN!

Simple...Foolproof...Low Cost

1500 WATT HOMELITE GENERATOR

Model 35A115
Homelite Generator
1500 Watts, 115 Volt
60 Cycle AC

WEIGHS ONLY 90 LBS.

As easy to move as an electric hand saw!

1. New Money-Saving features . . . No DC brushes; just two easy-to-get-at collector ring brushes . . . No commutator or DC windings . . . No intermediate couplings; armature keys directly to shaft. Fewer parts to wear out — longer trouble-free generator service.

2. Constant Voltage . . . less than 4% change from no load to full 1500 watt capacity . . . assures long service life for your electric tools . . . guarantees top performance at all times.

3. Overload Capacity . . . 1500 watt continuous duty with generous overload capacity prevents tool stalling under heavy loads . . . insures uninterrupted service even when starting loads exceed operating loads.

4. Compact and Lightweight . . . one man can easily carry this 90 lb. generator wherever you need electricity to power time-saving electric tools. No need for long, hazardous power-consuming cables.

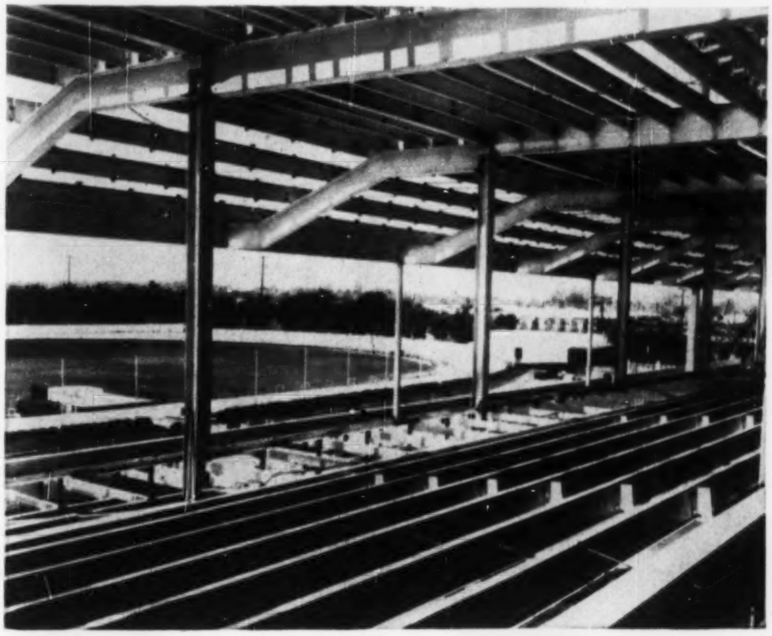
Whatever tools you want to operate — electric saws, drills, floodlights, grinders, belt sanders, hammers, — the new Homelite 35A115 generator can save you money. For a free demonstration or additional information, call your nearest Homelite representative, or write:

SAVE EVEN MORE! New Homelite idle control unit, available as optional accessory, runs engine at idle speed when no current is drawn . . . automatically brings engine to full speed when load is applied. Ask your Homelite representative to show you how this easily-installed accessory reduces engine wear . . . increases service life . . . cuts fuel consumption.

HOMELITE
A DIVISION OF TEXTRON, INC.
1112 RIVERDALE AVE., PORT CHESTER, N. Y.

Manufacturers of Carryable PUMPS • GENERATORS • BLOWERS • CHAIN SAWS

Field and Office



Grandstand Framed Quickly . . .

. . . With Bolted Steel Shapes

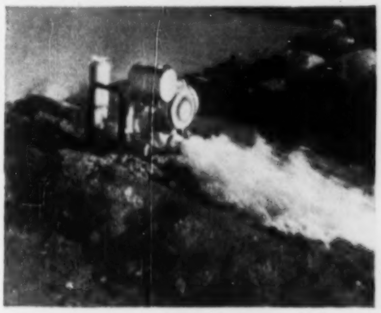
Before the dust of the season's final race had settled last June at the Biscayne Kennel Club's greyhound track in Miami, Fla., another speed contest had begun. The old wood stands had to be pulled down and replaced with a 5,000-seat steel-frame grandstand in time for the November meeting.

In less than 30 working days, Ludman Steel Co., Miami fabricator and erector, installed 940 tons of steel with a 30-man crew and 2 cranes. Included in the total were 194 tons of light rolled shapes, used mainly as floorbeams. These members were credited by Ludman with a sizable role in cutting erection time because they could be jockeyed into place quickly by hand. Spanning 20 ft and spaced 2 ft c-c, they were bolted to T-shaped clips welded to the top flanges of the girders.

After the steel framing was in place, permanent deck forms of corrugated steel were laid on top and covered with a 2½-in. concrete floor.

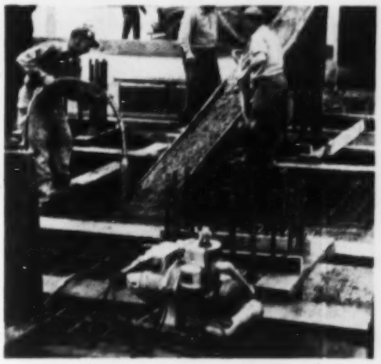
The grandstand was designed by Freeland & Bird, engineers and architects, of San Diego, Calif. Edward M. Fleming Construction Co., Inc., of Miami, was the general contractor.

Full Line of Carryable Construction Equipment Now Offered by Homelite



Carryable Diaphragm Pump . . . This self-priming, 120 pound diaphragm pump will handle water in the thickest sand, muck, or mud. Capacity: 5,000 g.p.h. Size: 3". Complete line of centrifugal pumps are also available in sizes from 1½" to 3".

Chain Saws For Every Job . . . Now you can choose from a full line of lightweight, powerful Homelite chain saws. From 3½ to 7 horsepower . . . 19 to 29 pounds. Brush cutting and clearing attachments are available to handle all your cutting jobs.



One-Man Electric Vibrator . . . It takes only one man to place concrete with powerful, Homelite high-cycle or universal electric concrete vibrators. Carryable Homelite generator provides power for high-cycle vibrators *and* 110 volt DC for all universal vibrators, tools and floodlights.

HOMELITE
a division of Textron Inc.
PORT CHESTER, NEW YORK

BRAND NEW for the "Michigan" name is carrying scraper in capacities up to 27 cu yd (heaped). Tractor is same as for corresponding size of dozer or tractor shovel, parts are interchangeable.

Clark Equipment Beefs Up Michigan Line

Anticipating the increased demand for construction machinery inherent in the new national highway program, a relative newcomer to the field announced a complete new line of heavy earthmoving equipment this week.

The manufacturer is Clark Equipment Co., which produces its "Michigan" construction machinery line at Benton Harbor, Michigan. The new machinery includes carrying scrapers, tractor dozers and tractor-shovels.

And Clark is adding something on which it is staking its multi-million investment in the field: Complete interchangeability of power components within each of three lines (sizes and horsepower) of equipment. Three basic series, known as 100, 200 and 300—tractor-shovels, dozers and carrying scrapers—will form a line of equipment in each of the three horsepower classes.

Thus, the 100 series will offer a tractor-shovel with 1 to 2¼-cu-yd bucket capacity, a tractor dozer, and a carrying scraper that can load 8 to 10½ yd. The 200 series has a 4-cu-yd tractor-shovel, a dozer, and a scraper that can load 12.7 to 18 yards. The 300 series will include a 6-cu-yd shovel, a dozer and a 20- to 27 cu yd scraper. Engines in the series are, respectively, 165, 210 and 335 horsepower.

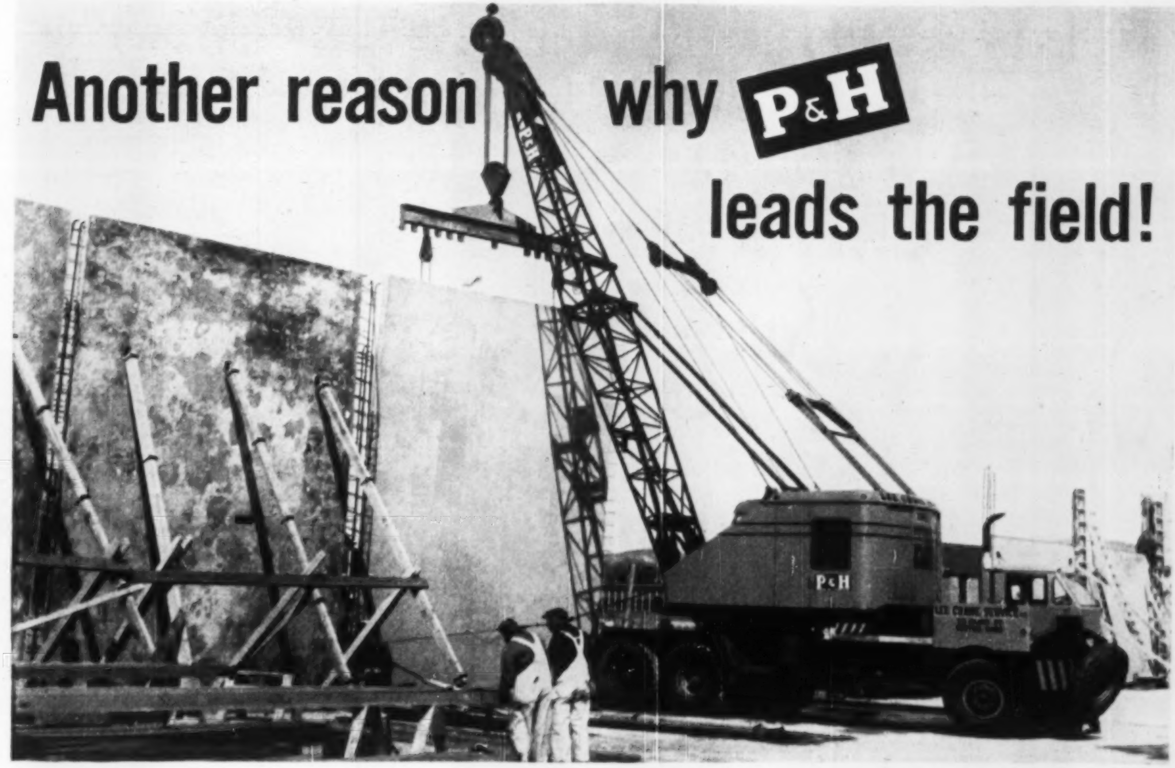
Clark's torque converters, four-speed power shift transmissions and planetary wheel axles with locking differentials are standard equipment on all models; so are full power steering and rear-wheel steering on the tractor-shovels. All the equipment is on rubber tires.

- **Bigger shovels**—Clark Equipment is an old name in the manufacture of drives and other components, and in the manufacture of fork-lift and materials-handling equipment. But it's a new one in heavy-duty construction machinery (ENR, April 19, p. 145).

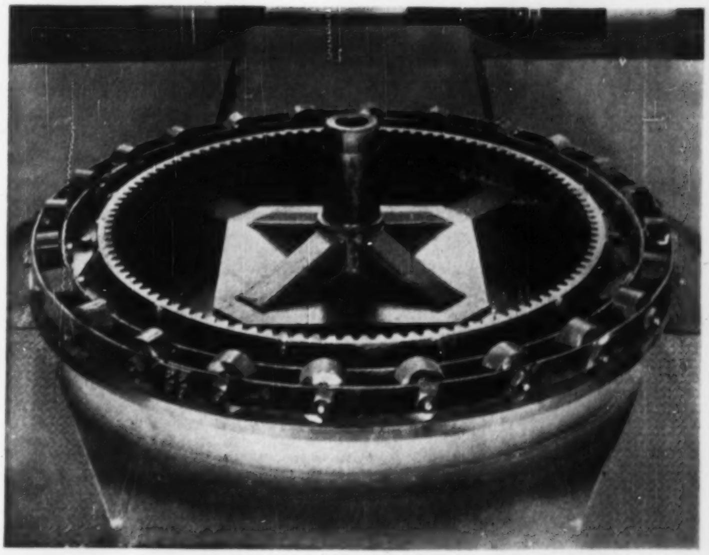
(*Continued on page 304*)

SIX CUBIC YARDS is only a single bite for the newest of the "Michigan Line" tractor-shovels. Same machines also are offered with dozer attachments in three sizes.

Another reason why P&H leads the field!



P&H Model 555A-TC with 35 ton capacity handles a wide range of jobs.



You'll recognize this view as one of the most important parts of the rugged P&H equipment. No other power crane or shovel offers operators a swing action that is equal to P&H in smoothness and speed. And that fast, smooth swing means more profitable production.

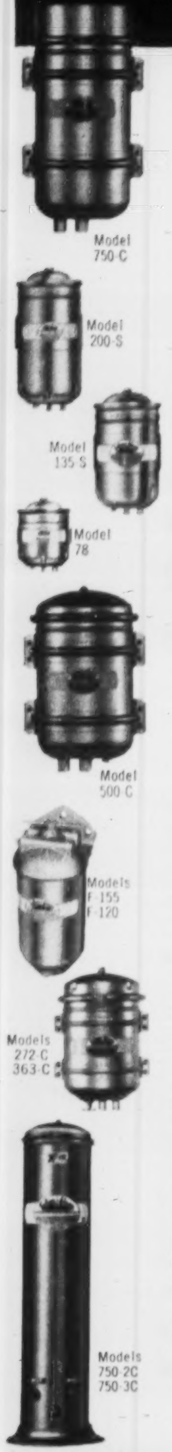
It's accomplished by putting the weight on the multiple rollers which, in turn distribute the weight over the entire diameter of the specially machined roller circle — just like a mammoth roller bearing. The rollers themselves carry the weight — the center pin merely acts as a guide.

Make certain you get the advantages of P&H live roller circle on your next power crane or shovel. Specify P&H.

BUILD BETTER ROADS TODAY FOR A GREATER AMERICA
See you at the ROAD SHOW CHICAGO
Jan. 28-Feb. 2, 1957
AMERICAN ROAD BUILDERS ASSOCIATION

HARNISCHFEGER

Construction & Mining Division, Milwaukee 46, Wisconsin



THERE'S A LUBER-FINER MODEL FOR EVERY TYPE OF ENGINE FOR EVERY TYPE OF OIL!

ONLY A GENUINE

Luber-finer

PLUS A GENUINE LUBER-FINER PACK

CAN GIVE THE EXCLUSIVE PATENTED FILTERING PROCESS THAT HAS MADE LUBER-FINER THE

Standard Of The Industry Since 1936

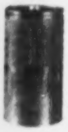
MODELS 78, 135-S, 200-S, featuring single-bolt lid, screw-in type pack, and overall compact design for use where space is limited. These Models provide the ultimate in filtration for passenger cars, small trucks and tractors, and other similar engines up to 5-quart, 6-quart, and 7-quart crankcase capacities.

MODELS 272-C and 363-C, featuring the Luber-finer single-bolt lid clamp, O-Ring lid gasket, screw-in type pack, and rugged construction throughout. Designed for heavy-duty service on gas, gasoline or diesel engines up to 3-gallon and 4-gallon crankcase capacities.

MODELS 500-C and 750-C, featuring the Luber-finer single-bolt lid clamp O-Ring lid gasket, large-capacity packs, and extra rugged construction to withstand the most severe service. Designed for use on gas, gasoline or diesel engines up to 5-gallon and 8-gallon crankcase capacities. Also widely used on fuel lines, hydraulic oil systems, and many other industrial applications.

MODELS 750-2C & 750-3C, featuring the Luber-finer single-bolt lid clamp, O-Ring lid gasket, and multiple packs for extra large capacity. Available with either wall or floor mounts for industrial use on engines up to 35-gallon sump, fuel lines up to 15 GPM, hydraulic oil systems up to 450 gals. For larger capacities, two or more Units can be connected in parallel.

MODELS F-120 and F-155, for gasoline and diesel fuel lines on mobile, stationary, or marine applications. Extremely efficient in removing impurities and contaminants from fuel. Single Units will handle flow rates from 0.5 to 1.0 GPM on suction or gravity flow. For larger capacities, connect two or more Units in parallel, or install on pressure-side of fuel pump.



GENUINE LUBER-FINER PACKS available in two types...

DIESELPAK — Expressly designed and recommended for use with all detergent-type compounded oils. Has the abilily to remove the most finely dispersed contaminants without removing or affecting the additives.

REFINING PACK — For use on straight mineral oil, synthetic oils, diesel fuel oil, hydraulic fluids, etc.

★ THERE IS A GENUINE LUBER-FINER MODEL FOR PASSENGER CARS, TRUCKS, TRACTORS, STATIONARY AND MARINE ENGINES, HYDRAULIC OIL SYSTEMS AND MANY INDUSTRIAL APPLICATIONS.

WRITE FOR COMPLETE INFORMATION TO DEPT. 72

LUBER-FINER, INC. 2514 S. Grand Ave., Los Angeles 7, Calif

(Continued from page 302)

Slightly over two years ago it plunged into the construction field—and into the full production (except for engines) of its own tractor-shovel, the present "100" series machine. As of this fall, more than 5,000 of these shovels had been sold. With acquisition, also in 1954, of Ross Carrier Corp. and its subsidiary, Michigan Power Shovel, the company took over a versatile materials-handler and a respected line of excavating equipment.

To the "100" series, however, Clark is now adding the "200" and "300". This makes tractor-shovels available, the biggest of which can load a 25 cu-yd truck in four passes or can carry more than seven tons of material itself at a speed of more than four mph. Both machines can travel over the road at 28 mph.

Companions to the shovels are two new tractor dozers—210 and 335-hp machines. The smaller weighs 38,000 lb, carries an 11-ft, 3-in. blade. The larger weighs 55,000 lb, carries a 13-ft, 3-in. blade. Dozer and shovel attachments are not interchangeable.

- **Scrapers brand new**—The scraper is said to be the first offered by any manufacturer with a power shift transmission in all sizes.

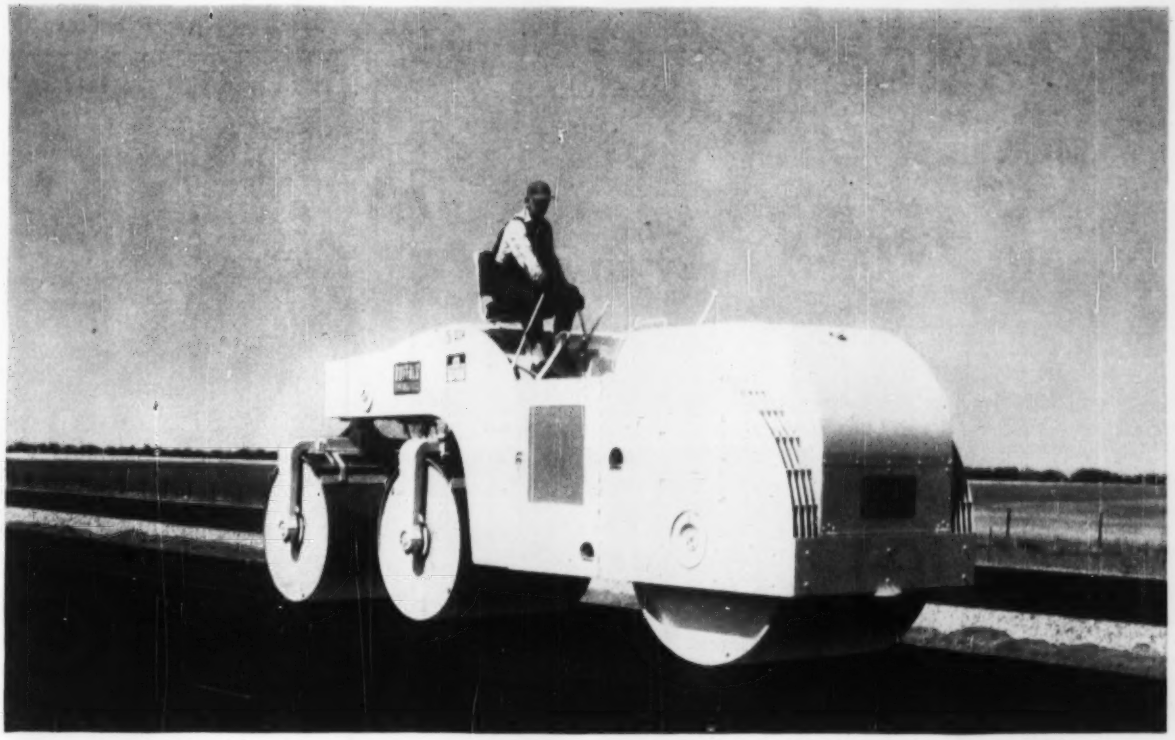
Top speed of the machines is more than 30 mph. Tractor units have full power steering; a low steering ratio to prevent oversteer at high speeds; full 90-deg steering in either direction (the manufacturer claims the machine will make a 180-deg turn on a 30-ft roadbed). Controls are fully hydraulic.

Bowls are of open-top design with no obstruction to interfere with quick loading by a tractor shovel. Sides are low for better stability. Double-acting hydraulic cylinders provide positive forward ejection and fast return, with precise control over spreading. Both blade and apron can be lowered with the engine stopped. CLARK EQUIPMENT CO., BENTON HARBOR, MICHIGAN.

Speedall Tractor Equipped With Lights for Night Work

Headlights, rear lights, and stop and tail lights are now provided as standard equipment on all three Pettibone Speedall models—1¼, 1¾ and 2¼ cu yd standard tractor shovels.

Two sealed-beam headlights at the front and a sealed-beam floodlight at the rear provide full job illumination, and a large combination stop and tail light provides an additional safety factor for night work. PETTIBONE-MULLIKEN CORP., 4700 W. DIVISION ST., CHICAGO 51, ILL.



"EASIEST HANDLING ROLLER" ... says operator as Buffalo-Springfield "Walking Beam" 3-Axle Tandem compacts Kansas Turnpike for San-Ore Construction

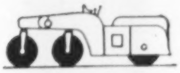
San-Ore Construction Co., McPherson, Kansas, used this Buffalo-Springfield Heavy-Duty "Walking Beam" 3-Axle Tandem Roller with *Complete Compaction Control* to get 99% specified densities on Sections 1 and 2 of the Kansas Turnpike.

Said Earl Robinson, operator: "We're finishing 2¾" asphalt down to 2½", and this roller is doing a beautiful job. There's plenty of power, and the synchronized hydraulic steering makes it the easiest handling roller I've ever run."

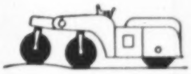
To which Charles Nickel, Superintendent, added: "This roller works and operates better than anything we have on the job."

Buffalo-Springfield's 3-Axle Tandem is *the best* 3-Axle Roller because its exclusive "Walking Beam" design and construction permits complete compaction control. There is never an increase in compaction pressure except when and where it is needed . . . on the high spots only! Then, through the "Walking Beam" semi-locked action almost 3 *times* the normal compaction pressure of the center roll may be applied to the high spots, providing a leveling action unequalled by any other type 3-axle tandem roller. No need for added cross-rolling time and expense, and consequently no possible damage to material that has been compacted and set. Another feature of the "Walking Beam" action is that all rolls can be released for full floation whenever the leveling action is not desired.

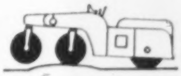
Let your nearest Buffalo-Springfield distributor show you why anything *less* than a genuine Buffalo-Springfield 3-Axle Tandem with exclusive "Walking Beam" Compaction Control is old-fashioned! Ask or write for Bulletin No. S-71-1255.



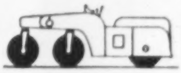
BEAM, semi-locked. Lead guide roll can rise above but not go below its normal position.



FIRST guide roll encounters "hump" exerting only normal pressure, "prepares" material.



CENTER guide roll rises on "hump," lifts lead roll off ground, exerts triple normal weight.

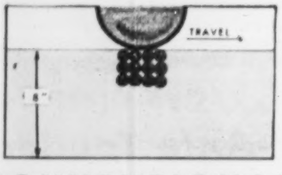


DRIVE roll follows through with normal pressure. Beam can be locked and unlocked.

The Standard of Comparison

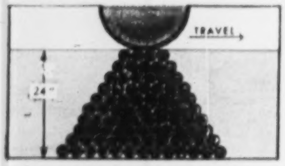
BUFFALO-SPRINGFIELD
ROLLER COMPANY
SPRINGFIELD, OHIO

VIBRATORY COMPACTION MEANS
DEEPER COMPACTION
in FEWER PASSES



CONVENTIONAL STATIC COMPACTION

Rollers relying on weight alone produce friction forces between soil particles that prevent densification at any great depth.



TERRAPAC DYNAMIC COMPACTION

Vibratory forces, transmitted to soil in all directions, reduces friction—facilitates relocation of particles at greater depths.

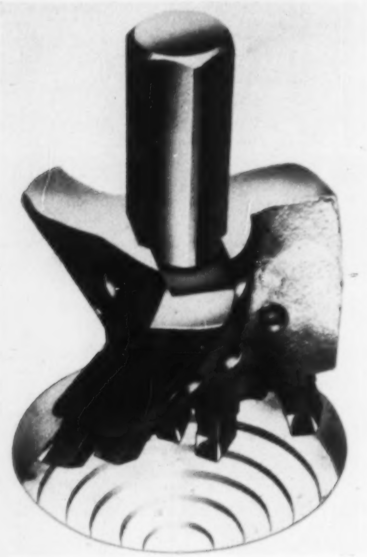
VIBRO-PLUS
TERRAPAC
VIBRATORY ROLLERS

Terrapac vibratory rollers can usually put in **two** or **three** times the depth of fill that would be allowed with a static roller—then compact it **faster, better and deeper in fewer passes**. . . . They work equally well in all materials, including clay and crushed rock and at both high and low extremes of the water content of the soil. . . . Total weight of the CH30 is only 3½ tons—light enough to be easily drawn by either rubber-tired or crawler tractors. . . . Diesel power gives maximum economy and efficiency — ability to work slopes.

Time is money—Terrapac saves time! You be the judge, ask your nearest Vibro-Plus distributor to demonstrate the CH30!

VIBRO+PLUS

PRODUCTS INCORPORATED
STANHOPE, NEW JERSEY



Drag Bit Drill Head Speeds up Auger Work

A new drag bit drill head is reputed to speed up auger drilling of blast holes and give substantial cost savings.

Known as Model AP, it is a 3-wing, prop-type head designed for use with special patented carbide-tipped bits. These bits have tapered shanks that drive-fit firmly in the drill head so that wedges or set screws are unnecessary.

Because head and bits act as one unit, the manufacturer says that the model will cut faster than ordinary drill heads with rotating bits. The attachment is available in five sizes for cutting holes from 4⅝ to 8⅝ in. in dia. AUSTIN POWDER CO., CLEVELAND, OHIO.

Metal Chimney Takes Half Hour to Install

The Air-Jet line of packaged chimneys now includes an all-metal type for gas-heating systems. Approved by Underwriters Laboratories and accepted by the Veterans Administration and Federal Housing Administration, it has a double-wall smoke pipe—aluminum inside, galvanized steel outside.

The chimney weighs less than 100 lb and can be installed in ½ manhours, according to the manufacturer.

Eight models, four pipe sizes—3 in. to 6 in.—are available. Besides flue sections, the chimney includes base support, connector sleeve, boot flashing, storm collar, and cap—the latter designed to prevent entry of snow and rain. GENERAL PRODUCTS CO., INC., FREDERICKSBURG, VA.

Publications

Welded wire fabric–The use of welded fire fabric reinforcement in asphaltic concrete pavement overlays is the subject of a technical bulletin being distributed by the American Road Builders Association. In two parts, the bulletin describes in detail the resurfacing in 1955 of major portions of the Detroit Willow Run Airport, and a report on an earlier job in Washington, D. C. Wire Reinforcement Institute, Dept. 215, National Press Bldg., Washington 4, D. C.

Stud welding–A 36-page stud-welding booklet published by KSM Products, covers standard designs and specifications for studs, pins, and tapped pads. Each specification lists size minimums and maximums. It details mechanical properties, chemistry, thread sizes, plating and annealing information and other data valuable to engineers and purchasing men. KSM Products, Inc., Merchantville 8, N. J.

Glass for Construction–Libby-Owens-Ford has published a 28-page booklet containing sections dealing with the company's polished plate glass, window and safety glass, colored structural glass, bent glass, and glass doors. Included are data on standard sliding doors, metal and wood sash, and Thermopane glazing. Libby-Owens-Ford Glass Co., 608 Madison Ave., Toledo 3, Ohio.

Bituminous plant – A new 12-page folder, describing the Model 840-B continuous-mix asphalt plant has been announced by the Barber-Greene Co. Job photos, model photos and cutaway drawings describe plant setups and various components. Barber Greene Co., 400 N. Highland Ave., Aurora, Ill.

Templates–The Alvin Template Catalog is an illustrated presentation of the full line of Alvin template drafting aids. A special department of this company will also make up templates to special requirements. Alvin & Co., Windsor, Conn.

Volume computer–A concrete volume computer which makes it simple to calculate the volume of concrete required in cubic yards is available for distribution from the Stow Mfg. Co., Binghamton, N. Y.

Scaffolding–A bulletin is now available showing various applications of advance tubular steel scaffold as employed for building construction, maintenance and repair. Beaver-Advance Corp., Ellwood City, Pa.

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Research

One Way to Meet Rigid Airfield

An experiment in use of new finishing equipment to meet the rigid paving specifications now being promulgated by the Air Force has been declared successful on an Air Force paving job at Castle Air Force Base, near Merced, Calif.

The project was part of a $30-million construction program at the base, home of the 93rd Bombing Wing and nerve center of the B-52 training program.

The project called for paving a parking apron and taxiway, and was the first big job required to meet the new paving specifications: any part of the pavement must be within ½ in. of design grade. A 16-ft straightedge is used in place of the usual 10-ft straightedge to confirm maximum variation of ⅛ in.

The contractor bid $1,046,000 for portland cement concrete paving of a parking apron with overall length of 1,486 ft and a maximum width of 700 ft; a taxiway 75 ft wide and 1,225 ft long. Depth of the concrete varies from 17 in. to 19 in., depending on location, with edge thickness of 21 in.

• **Special equipment**—The joint venture contractors, R. A. Westbrook Inc. and Morrison-Kundsen Inc., proposed the use of Lewis finishing equipment.

Finishing was required on variable grades, vertical and horizontal curves on a 25-ft lane width. The concrete mix design was a nominal 2½ in. maximum aggregate with a cement content of 4.96 sacks per cu yd at 2.9% air. Sand aggregate ratio was 22%.

• **Machines**—Two machines were involved on the job: a Lewis leveling attachment and a Lewis longitudinal float finisher. Both were designed by Hurst Lewis and built by the Concrete Manufacturing Corp. of El Monte, Calif.

The leveling attachment consists of a suspended cut screed operating with a transverse movement. Ahead of the cut screed is a mechanical shoveling device to distribute the mix, followed by a pan vibrator.

The self-powered longitudinal float finisher has a 25-ft wheelbase. At the center of the machine is a transverse suspended planing screed, preceded by a mechanical tamping bar and a mechanical shoveling device, which compensates for concrete flow on a transverse grade.

The screed is followed by the cut float, also suspended, which acts as an indicator of surface high spots. Since it is a cutter it will remove the high spots—such as those resulting from a boil under the planing screed or lifting of the screed through use of a harsh or dry mix. The cut float is a toothed bar which operates with a transverse motion. It is followed by a 20-ft-long chevron float with the apex at the center, which floats free on the concrete surface. A burlap drag is suspended by outriggers at the rear.

• **Operation**—Initial breakdown and rough screeding is done in a single action by the spreader with the finishing attachment. Internal vibration is accomplished by stinger-type vibrators conventionally mounted on the back of the spreader. This machine, making only one pass, levels the surface approximately, leaving very little material to be handled by the float finisher.

Next comes the float finisher, which combines the operation of screed, float and drag to complete the machine operation.

Final finishing was done by a manually operated straightedge finisher, edging tools and a manually applied burlap drag finish.

After the work was completed, the surface was checked with the straightedge and compliance to job specifications was found good longitudinally and transverse control was good within lame width.

The contract was administered by the San Francisco District, Corps of Engineers, under Colonel John A. Graf, district engineer.

Researchers Confirm How Ozone Forms in Smog Areas

Researchers at the Franklin Institute in Philadelphia have confirmed just how ozone forms in smog areas. However, the major mystery—what does the ozone then react with to form smog—still remains unsolved.

According to an institute spokesman, the fact that high concentrations of ozone are produced by reactions between nitrogen dioxide and organic compounds in the sunlit atmosphere is explained by the simultaneous formation of chemical identified as peracyl nitrite. It happens like this. Nitrogen dioxide, a man-made pollutant, decomposes in sunlight to form nitric oxide and atomic oxygen. The atomic oxygen combines with the normal oxygen of the atmosphere to form ozone. But the nitric oxide is removed from the scene

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by reacting with organic pollutants to form the peracyl nitrite. If the nitric oxide were *not* removed, it would react with the ozone; thus it would prohibit the ozone from building up to the high concentrations found in smog.

To complete the cycle, the peracyl nitrite itself is decomposed slowly by sunlight to produce nitrogen dioxide, the substance which began the cycle. The nitrogen dioxide is used over and over again to produce ozone.

• Early studies—Through studying nitrogen dioxide reactions with organic compounds (synthetic smog), institute scientists discovered that the peracyl nitrite was a major product in addition to ozone.

The also found that this compound along with ozone, is formed when auto exhaust is diluted with air and irradiated with artificial sunlight. The only way to check the prediction that peracyl nitrite would be found in actual smog was to take an infra-red absorption cell and spectrometer to Los Angeles for on-the-spot studies.

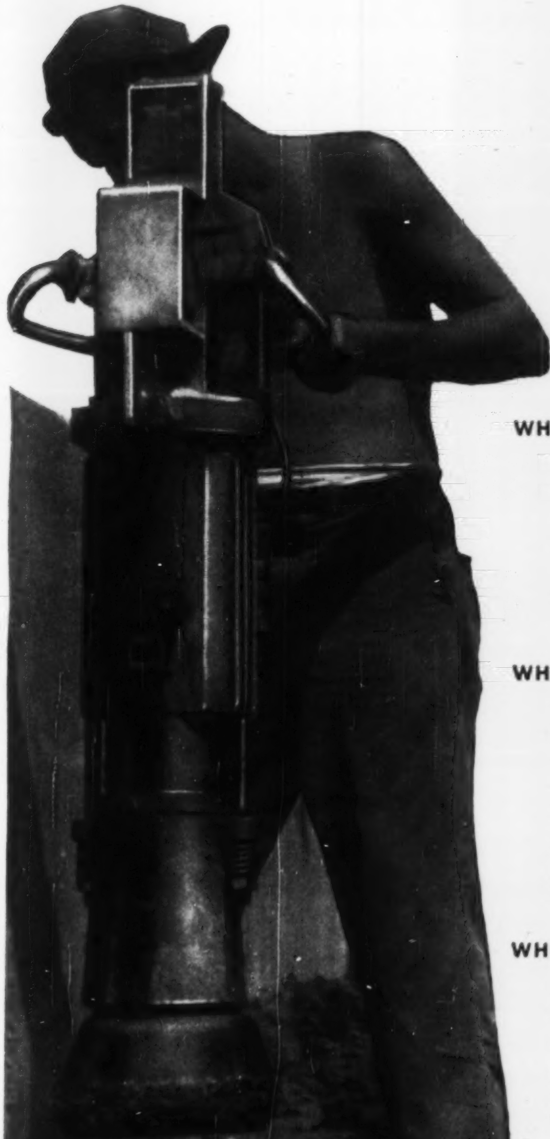
Edgar R. Stephens and Philip L. Hanst, both research chemists with the Institute, made the Los Angeles tests and will continue to examine smog for other chemicals. They also plan to use the spectrometer, known affectionately as "Silent Sam," in cooperation with other agencies to find the chemicals that cause crop damage and eye irritation. This air pollution program by the Franklin Institute is sponsored by the American Petroleum Institute.

Ohio Group Checks Effects Of Salt on Concrete Pavement

An experiment now under way in Akron, Ohio, and expected to continue for several winters, is looked upon as having far-reaching results in the long controversy over whether or not salt damages concrete surfaces.

Sponsored by the Akron Building Materials Institute, the experiment includes the regular application of salt to 24 concrete slabs, each formed under different formulas. Twenty-four other slabs, which are exact duplicates, will be left salt-free as controls.

R. J. Frisby, executive director of the Akron Building Materials Institute, said he was optimistic about the weathering qualities of air-entrained dry mixes properly cured. The City of Akron has not built a concrete surface street for 30 years, until Seiberling Street was paved with concrete last summer. The Akron Expressway pavements have a concrete base but a bituminous surface.



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Battler Against Smog

W. L. Faith will direct Air Pollution Foundation

W. L. Faith has succeeded Lauren B. Hitchcock as managing director of the Air Pollution Foundation, Los Angeles industry-supported agency for battling smog. Hitchcock resigned to return to private industrial consultative practice.

Faith, 49, had been chief engineer of the foundation since its start in 1954. Holder of a Ph.D. in chemical engineering from the University of Illinois, he served as deputy director of the WPB's office of production research during World War II.

Faith's election—and that of A. J. Gock, Bank of America director, as foundation president and board chairman—came during the foundation's annual meeting, held in conjunction with the Second Southern California Conference on Elimination of Air Pollution.

Los Angeles residents—hoping for promises of a sudden end to their smog troubles—were disappointed by the conference. Officials of Los Angeles County Air Pollution Control District, however, found a basis for optimism in statistics indicating smog concentrations have been less this year than last, in spite of atmospheric conditions more favorable to smog formation. But it was cautious, long-range optimism. And APF's Hitchcock, though crediting control work to date with impressive accomplishments in view of increasing population and industrial activity, found no evidence smog is diminishing.

He recommended a crash program with expenditures on the order of $40 million in order to speed up work on the problem.

All were agreed, however, on progress in positive identification of smog sources. In particular, it was agreed that the automobile's contribution is now fact, not theory. Hitchcock said flatly that "over one-half of our air pollution comes from motor vehicles, including three-fourths of the hydrocarbons and two-thirds of the nitrogen oxides" that "are now known to be our principal smog formers".

J. M. Campbell, chairman of the Automobile Manufacturers Association vehicle combustion products subcommittee, reported progress in development of exhaust controls. A fuel cut-off device—to eliminate hydrocarbon emissions during deceleration—should be available with 1958 models, Campbell said.

However, the afterburner muffler conceived to be a far more effective solution, while "in a very good state of development," is reported still some years off.

Irrigation Expert A. B. Reeves To Retire From Reclamation

A widely known authority on irrigation engineering, Arthur B. Reeves, chief of the U. S. Bureau of Reclamation's division of irrigation operations in Denver, will retire Nov. 30. This will wind up a 43-year career of service to the government.

In this last position, which he assumed in 1954, Reeves has supervised the technical activities of the bureau's irrigation systems in 17 western states. A 1910 graduate of Iowa State College, he began his engineering career with the Reclamation Service, predecessor to the present bureau. During his long career, Reeves has been head of the structures and tunnels section of the canals branch and chief of the canals branch.

Reeves took part in the design of Hoover Dam and has supervised design of some of the world's largest irrigation canals, including the Delta-Mendota, portions of the Friant-Kern canals and Columbia Basin canals.

He has traveled abroad to advise on the Snowy Mountains Hydro-Electric Project in Australia. And he advised

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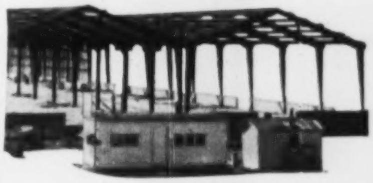

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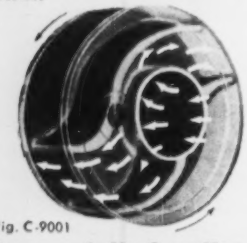
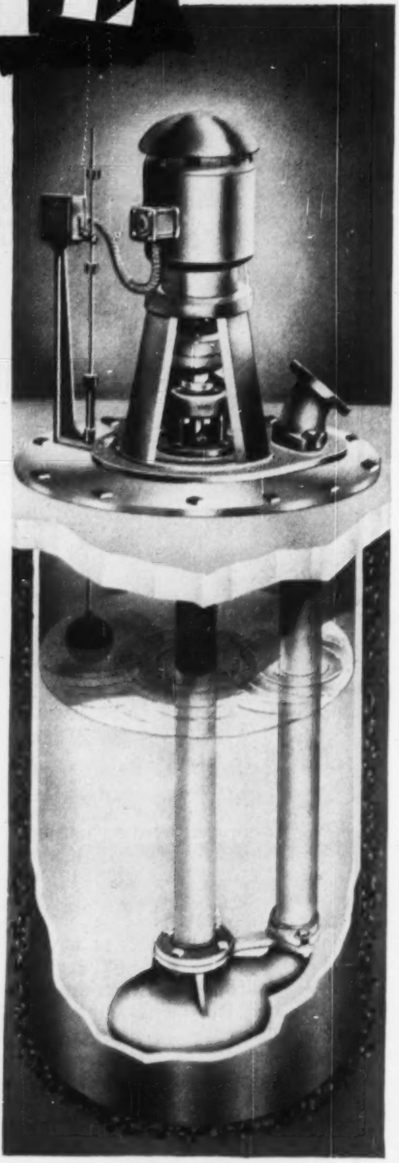


Fig. C-9001



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the International Bank for Reconstruction and Development on plans and designs for an irrigation project in Peru.

A member of the United States National Committee of the International Commission on Irrigation and Drainage, Reeves is also the author of numerous technical articles and papers on the design and the construction of irrigation facilities.

Ezra Whitman Retires From Consulting Firm

The retirement, Nov. 1, of Ezra B. Whitman from active participation in the Baltimore consulting firm of Whitman, Requardt & Associates, marks a milestone in the career of one of the nation's notable engineers. Whitman has been president of both the American Society of Civil Engineers (1943) and the American Institute of Consulting Engineers (1945).

Although his firm is known particularly for its work in the water supply and sanitation field, Whitman was a member and chairman of the Maryland Public Service Commission from 1921 to 1927 and was chairman of the Maryland State Roads Commission from 1939 to 1945.

Whitman, who will continue to have offices with his firm as consultant, opened his first consulting office in New York City immediately after graduating from Cornell University in 1901. He moved to Baltimore in 1906 to design the city's sewage treatment plant and then in 1911 became the city's water engineer. During that period he designed and built Loch Raven Dam and the Montebello filtration plant.

American Bridge Promotes Two Executive Engineers

E. E. McKeen has been named general erecting manager for U. S. Steel Corp.'s American Bridge Division, Pittsburgh. Moving into McKeen's former spot in the San Francisco regional headquarters of the firm, George W. Faulkner has been appointed erecting manager for the western states territory.

The two executives, both civil engineers, have spent their entire careers with the bridge division.

McKeen graduated from Massachusetts Institute of Technology in 1923 and began as a draftsman at the company's plant in Ambridge, Pa. He had held the San Francisco post since the end of World War II.

Faulkner graduated from Iowa State College in 1937 and took a job drafting at the Gary, Ind., plant. He became McKeen's assistant in San Francisco last year.

Can Your Water Pipe Withstand Three Times the Working Pressure?

As this chart shows, steel water pipe can withstand at least three times the calculated maximum allowable working pressure before bursting.

THEORETICAL INTERNAL PRESSURES OF STEEL PIPE

	1/4 in.			5/16 in.			3/8 in.			7/16 in.			1/2 in.		
INSIDE DIAM IN.	EST SHIP WT LB/FT	MAX WRK PRESS PSI	MIN BURST PRESS PSI	EST SHIP WT LB/FT	MAX WRK PRESS PSI	MIN BURST PRESS PSI	EST SHIP WT LB/FT	MAX WRK PRESS PSI	MIN BURST PRESS PSI	EST SHIP WT LB/FT	MAX WRK PRESS PSI	MIN BURST PRESS PSI	EST SHIP WT LB/FT	MAX WRK PRESS PSI	MIN BURST PRESS PSI
18	50	445	1390	62	555	1735	75	665	2080	88	775	2430	101	890	2780
20	55	400	1250	69	500	1560	83	600	1875	97	700	2180	111	800	2500
22	61	365	1135	76	465	1420	91	550	1700	107	640	1985	122	730	2270
24	67	335	1040	83	420	1300	100	505	1560	116	585	1820	133	665	2080
30	83	270	835	104	340	1040	125	405	1250	145	475	1455	166	535	1670
36	104	225	695	128	280	870	154	340	1040	179	395	1210	204	445	1390
42	116	195	595	144	240	745	173	285	890	202	335	1040	231	380	1190
48	132	170	520	165	210	650	198	250	780	231	290	910	264	330	1040
54				186	190	580	223	225	695	260	260	810	297	295	925
60				207	170	525	248	200	625	289	235	730	330	265	835
72							306	170	520	355	195	605	405	220	695
84							346	145	450	403	170	520	460	190	595
96	The recommended minimum wall thickness is approximately the pipe diameter divided by 165. Pipe having this diameter-thickness ratio, when backfilled and properly tamped, will withstand any depth of cover. For buried pipe, the recommended minimum wall thickness is shown immediately to the right of the heavy black line.									464	145	455	524	165	520
108													*605	150	465
120													*656	135	415

*Under certain conditions stiffeners may be required to reduce deflections.

$P = \frac{t \times Ts}{r}$ P = internal pressure, psi t = thickness, in. Ts = allowable unit stress = 60% x 27,000 (yield point) = 16,000 psi

r = radius of pipe, in. Based on use of ASTM A-283, Grade B Steel, 50,000 psi min. ultimate tensile strength

Take a look at just two examples:

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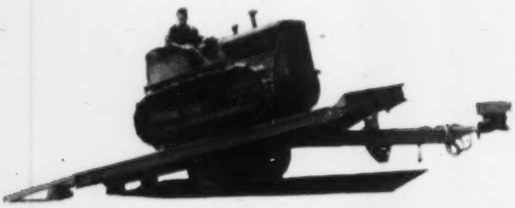

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Obituaries

Warren Esterly Hall, 75, died at New Smyrna Beach, Fla. A hydraulic engineer, he was district engineer, water resources division, U. S. Geological Survey, in the Southeastern states for several years prior to World War I. After the war he became a partner in the firm of B. M. Hall & Sons of Atlanta, where he was engaged in dam design and construction in the Southeast. Later, he was hydraulic engineer for U. S. Bureau of Fish and Wild Life.

Wallace B. Boggs, 65, retired county surveyor and road commissioner of Alameda County, Calif., died Nov. 6 in Oakland, Calif. A 1912 civil engineering graduate of the University of California, he joined the Alameda County surveyor's office in 1912. He served the county until 1938, when he became a consulting engineer in Oakland. In 1938 he left private practice to become county surveyor.

Horace S. Hunt, 75, expert on hydraulic plant and dam construction, died Nov. 10 in Jackson, Mich. Hunt received his civil engineering degree from Michigan State University in 1905. At the time of his death he was president of Fargo Engineering Co. of Jackson. During his lifetime he participated in the design and construction of some 40 dams and power plants.

Walter Harold Johnson, 32, assistant bridge engineer for the California Division of Highways, was killed Nov. 6 near Larkspur, Calif., when he fell 40 ft from an overpass on which crews were pouring concrete. He received his degree at Washington State College.

James N. Alexander, Jr., 54, an engineer who specialized in public transportation, died Nov. 11 at Haddon Heights, N. J. A graduate of Pennsylvania State University, he had been associated with firms in Buffalo, Denver and New York, in addition to the Phildelphia area.

Arnold A. Murdock, 63, building contractor of Columbus, Ohio, and first chairman of the Franklin County Rural Zoning Board, died recently.

Andrew F. Dardis, former land and property engineer with the National Capital Park and Planning Commission, died Nov. 19 in Washington, D. C. A veteran of more than 18 years of Federal service, Dardis was with the office of National Capital Parks for six years prior to World War II, when he transferred to the Corps of Engineers. He returned as parks-aide in 1948.

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AMERICAN MUTUAL points with pride to its many contractors whose years of close cooperation with American Mutual Safety Engineers have resulted in savings of countless lives, limbs and dollars!

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Hughes-Foulkrod Co. Philadelphia, Pa.	General Contracting	23 years
Southern Engineering Co. Charlotte, N. C.	General Contracting	17 years
H. Wales Lines Co. Meriden, Conn.	General Contracting	29 years

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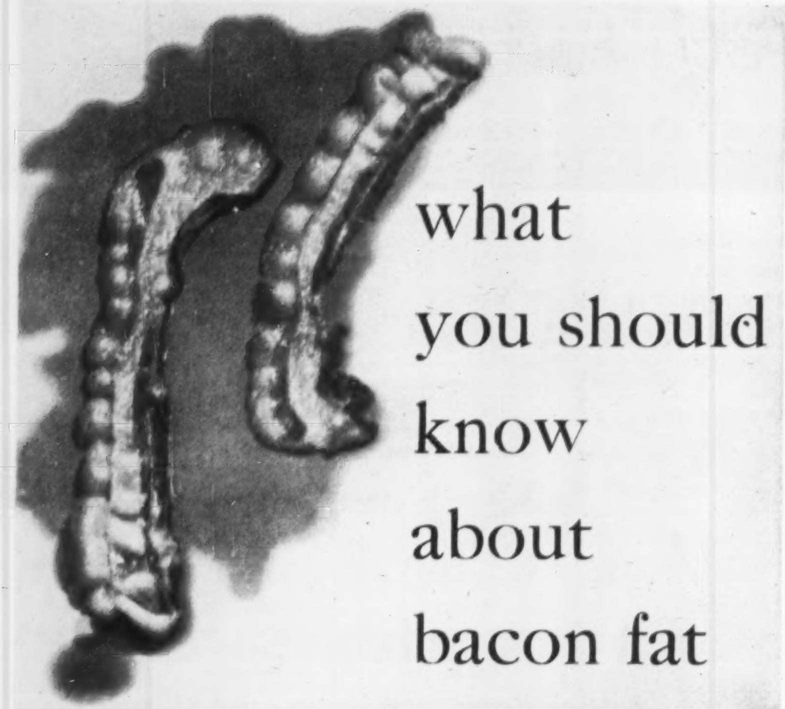

what you should know about bacon fat and Albanene®

Here's the buying information you should have to get the *best* value when you buy tracing paper.

1. **The usual way** of "transparentizing" tracing papers is with waxes or mineral oils—much the way bacon fat makes a paper towel transparent. Eventually, these oily fluids "leak" out—leaving the paper opaque and useless for reproductions.

   Result: Valuable drawings on ordinary tracing papers eventually become yellow or brittle—lose their reproduction qualities. And, these days, replacements often cost twice as much as the originals.

2. **The K & E way**—Albanene tracing paper is made transparent with an inert synthetic resin which is chemically stable . . . can't leak out—ever!

   Result: Albanene stays transparent . . . stays strong . . . protects every nickel you invest in time and talent working on it.

   Important: During manufacture, constant testing *guarantees* uniformity as well as pencil taking and erasing qualities. The very qualities that have made Albanene—America's best selling tracing paper.

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Legal

Contractor Not Liable For Unauthorized Work

A contractor cannot recover from a prime contractor for work done unless the person who authorized the work was an agent of the prime contractor. This case illustrates the problem.

J. A. Singarella Co. entered into a contract with the Metropolitan Transit Authority of Boston to perform a construction job which necessitated some excavation work in a street. The contractor received a permit from the commissioner of public works to do the excavating. One of the conditions of the permit was this: "In case of any opening, the restoration of the permanent paving or other permanent surface of the street shall be effected by the city as directed by the commissioner, the work to be done by city employees or by contract or otherwise in his discretion, the standard, type and extent of the repairs necessary to effect such restoration to be determined by him and to be paid for by the person accepting the permit, such payment to be made in advance on the basis of the commissioner's estimate, or at the commissioner's election, during the progress of or after the completion of such restoration."

The commissioner requested another contractor, John McCourt Co. to restore the top filling, which it did. Before McCourt began this work, Singarella notified McCourt it would not pay it if it did the work. McCourt brought an action against Singarella to recover for the work done and obtained a recovery. The judgment was reversed on appeal[1] and the case dismissed.

In holding that Singarella was not liable to McCourt, the appellate court stated: "The liability of the defendant (Singarella) must be determined by the terms of the written contract. The permit was granted by the city and accepted by the defendant. There were no other parties to it. The restoration of the permanent pavement was to 'be effected by the city.' In other words, the city was to do the work. Payment for doing the work was to be made by the city. There was no provision in the permit requiring the permittee to pay anyone else. Payment to the city may be required before the work is undertaken, during its progress, or after its completion in the discretion of the commissioner acting not as the agent for the permittee but as an officer of the city. Acting in that capacity the work may be done by city employees or by contract as the commissioner may

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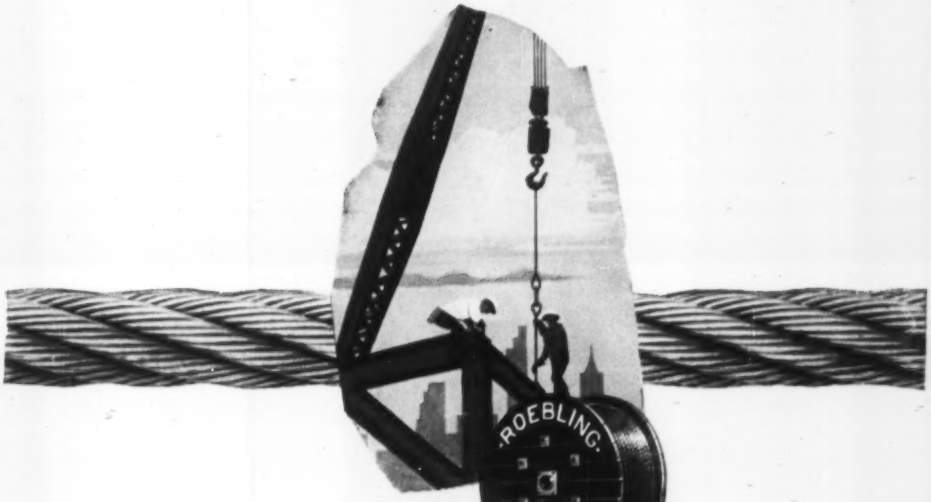

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direct. In any event, the permit requires the permittee to reimburse the city for the expense incurred in the restoration of the pavement. It is not contended that, if the work was done by the city or by a contractor, the employees of either became employees of the permittee or that in such an even he would be liable for their wages, workmen's compensation, or other benefits that an employer is to furnish to his employees. The commissioner could not bind the defendant by requesting the performance of work by the plaintiff. The commissioner was not the agent of the defendant. He acted solely in behalf of the city. His powers were limited. Wormstead v. Lynn, 184 Mass. 425, 68 N.E. 841; City of Quincy v. Brooks-Skinner, Inc., 325 Mass. 406, 413, 91 N.E. 2d 206. In the absence of any ordinances or statutory provisions we need not decide whether the plaintiff could recover against the city. Neither do we decide whether the city could sue the defendant. We merely hold that on the record the plaintiff cannot recover against the defendant."

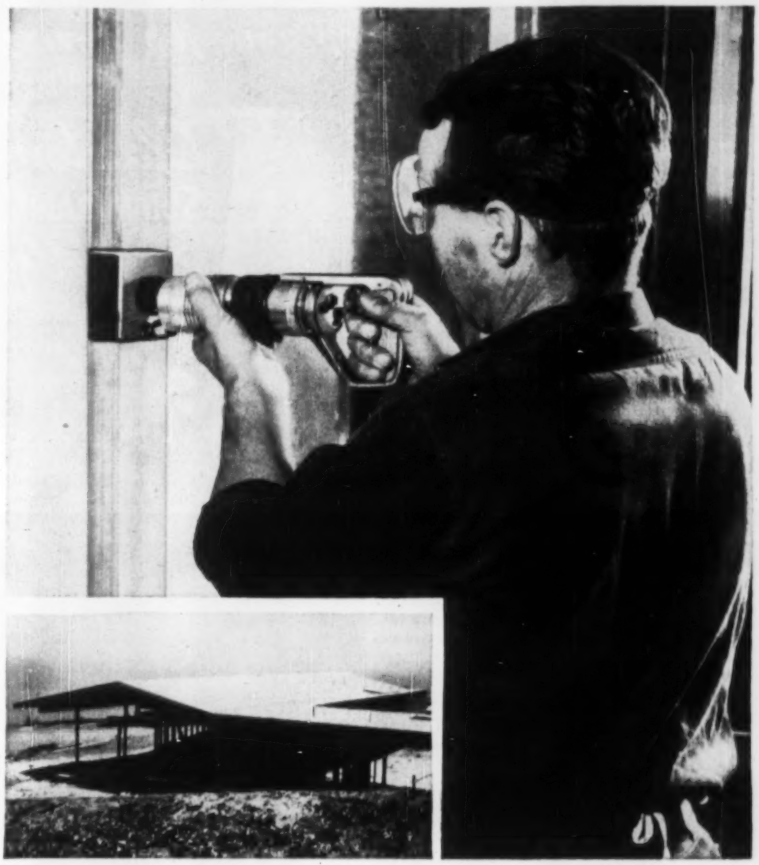
---

(1) John Mc Court v. Singarella, 135 N.E. 2d 912, Supreme Judicial Court of Mass., July 19, 1956.

All Claims Are Not Waived By Acceptance of Building

By accepting a building from a contractor, an owner waives claims for damages stemming from faulty construction insofar as a normal inspection would have disclosed the defects. The waiver, however, does not extend to latent or concealed defects.

In a case that came before an Ohio court, a contract had been entered into for the purchase of land and the construction of a house. The purchasers did not see the house until the basement was completed and the first floor studding was up. When the building was completed, they paid the full purchase price and moved in. Later, water began running into the basement, causing severe damage. Cracks appeared in the foundation and the basement floor. Other defects developed and the purchasers discovered that parts of the work did not comply with the plans and specifications. After the seller refused to do anything to remedy the defects, the purchasers employed others to excavate around the house down to the foot of the basement wall, where it was found that the drainage tile, which the specifications called for, was improperly placed, not to grade, broken, and filled with sand and clay, and in such a condition that it could not drain the accumulated water. The asphalt waterproofing on the walls was spotty and in-



California contractor estimates:

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Contractor Bert Pickney says, "The Stud Driver cuts time and labor costs around 75% in anchoring beam supports, partition sills and furring to concrete. It took us only half a day to install the sills—a 2-day job with bolts. No pre-drilling and sills set tight! I certainly recommend the Stud Driver to any contractor!"

YOU CAN SPEED ALL STUD FASTENINGS—light, medium and heavy-duty—with the Remington Stud Driver. It sets *both* ¼" and ⅜" diameter studs in steel or concrete—up to 6 studs a minute either size. The tool is cartridge-powered, portable, ready to work *anywhere*. Forty styles and lengths of Remington Studs to choose from. Get full details by mailing coupon.

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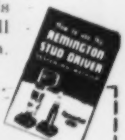

sufficient. The purchasers brought an action to recover the damages sustained.

The trial court dismissed the action on the grounds that the building was completed at the time the deed was accepted, that the purchasers had an opportunity and did examine the building and found it acceptable, and that such conduct constituted a waiver of defects. The appellate court reversed the judgment and directed a new trial, holding that while acceptance of the deed constituted a waiver of such defects that the purchaser had knowledge of, it was not a waiver of latent defects.[1]

The appellate court stated: "He (purchaser) is chargeable with knowledge of all things which a normal inspection under the circumstances would reveal, and he would be estopped to claim differently thereafter or complain thereof if he should have had such knowledge or made no reservation. However, concerning latent and concealed defects which a normal inspection on his part could not reveal, the situation is different. The vendor, having represented by the tender of the deed that the contract had been fulfilled, would be guilty of constructive fraud as to latent and concealed defects. In the instant case, the basement having already been built when the contract was entered into, the plaintiffs (purchasers) had no means of knowing, except for the word of the defendant (seller), that proper drainage had been installed in accordance with the plans and specifications. Certainly, under these circumstances, they should have a remedy."

---

(1) Galvin v. Keen, 135 N.E. 2d 769, Court of Appeals of Ohio, Nov. 30, 1955.

Labor Contract No Defense In Jurisdictional Dispute

Taft-Hartley Act restrictions on labor and management conduct during jurisdictional disputes have been further construed by the National Labor Relations Board. NLRB now say:

- A union that protests the contracting out by its employer of maintenance work to a building trade cannot use its labor contract with the employer as a defense "where the contract fails to provide a basis for the claim (to the disputed work) in clear and unambiguous language, regardless of past custom or practice."
- An employer cannot duck out from under a jurisdictional dispute by laying off for "lack of work" the employees who were hired to do the work over which the dispute developed.

In the first case, the International Longshoremen's Association, which had

(Legal continued on page 324)

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340,000 BTU's
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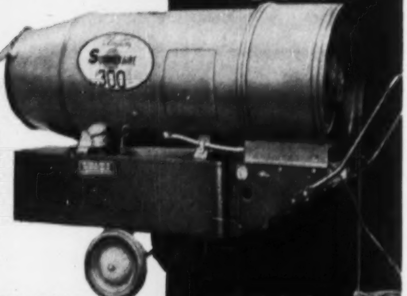

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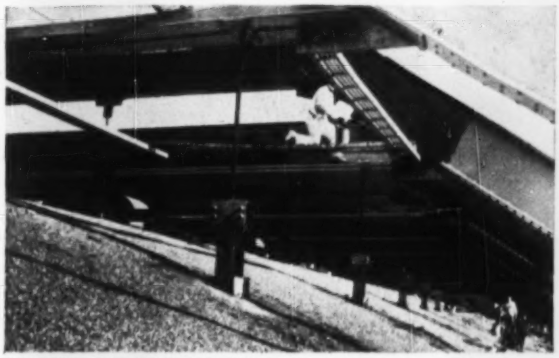
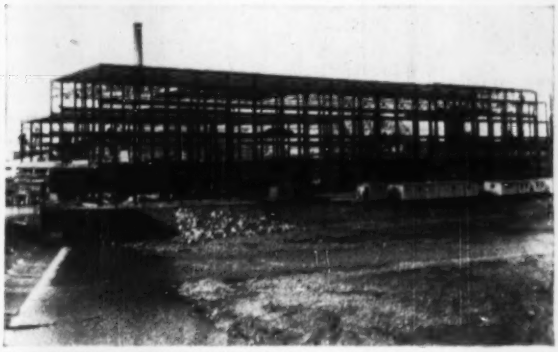


SAVES DOLLARS PER TON! Faster than riveting, high strength bolting shortened erection schedule for externally supported roof of a Republic Aviation Corp. building. Bolting used two-man crews, less equipment, and saved an estimated $7 per ton of erected steel.

TIME CUT 33%! All connections in the steelwork of the 227,000 sq. ft. Pier "A" at the Hoboken Port Authority piers were completed in 2 months — a month less than for a similar job riveted. Production in the field averaged twice that of riveting with same number of men.



STRONGER CONNECTIONS — FASTER! High strength bolting for P. H. Glatfelter Company paper mill has fortified joints against much vibration and dynamic stress from machinery. Crews can be quickly trained on out-of-way location, and structures go up fast.

ECONOMY IN ASSEMBLY! For Hangar No. 9 at New York International Airport, members were assembled virtually from the ground up, since truss section height came to 22 ft. Field assembly proved economical because bolting is fast, conserves manpower.

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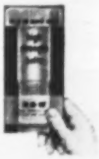
THOSE are four typical cases you see above. In all cases, the erectors relied on RB&W High Strength Bolts for connecting the steel, and reported improvements in construction along with worthwhile savings.

Clean threaded, uniform RB&W high strength bolts assemble easily. Once tightened to recommended minimum tension, they *stay* tight. Stronger in shear and in tension under all types of loads, they can be used in place of rivets anywhere . . . buildings, bridges, equipment. The AISC approves. So do local codes.

Bulletin HS-1 gives information on high strength bolting useful on the job. Send for as many free copies as you need.



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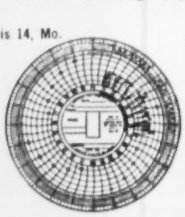

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S56-6A

a union-shop contract with its employer, protested the contracting out of maintenance painting to AFL-CIO painters. Dismissing the argument that the practice meant loss of employment opportunities to the ILA, the board said the ILA contract did not forbid in clear or unambiguous language the contracting out of maintenance work. The result: ILA unlawfully called a jurisdictional strike over work it wasn't entitled to.

In the second case, an employer, whose labor contract was with textile workers, hired outside operating engineers as maintenance mechanics. Outside millwrights claimed the work. To avoid a problem, the operating engineers were discharged. The NLRB said that constituted unlawful discrimination based on union membership.

Some Rules Used by Courts In Construing Contracts

It is well settled law that a written contract is construed strongly against the party who prepared it where the language is ambiguous or uncertain. Contracts should be construed in accordance with justice and common sense and the probable intent of the parties.[1]

Contracts are generally construed and given effect in accordance with the law of the state where the contract is to be performed.[2]

However, where it is contended that the contract was in violation of law, as being usurious, the validity of the contract will be judged by the law of the state where the contract was made or entered into.[3]

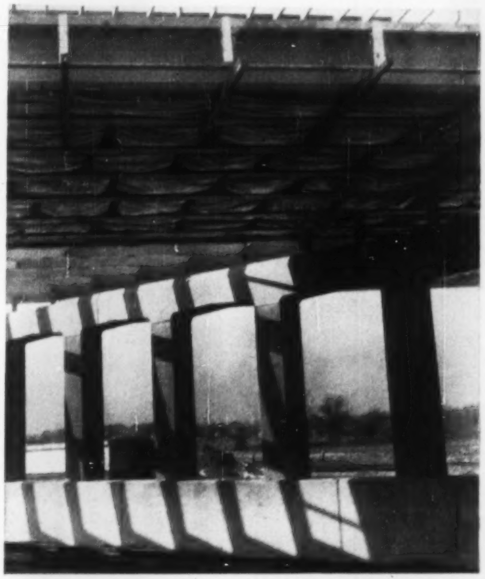
In the construction of contracts the court must, if possible, ascertain and give effect to the mutual intent of the parties.

A contract must be construed as a whole, and the intention of the parties is to be collected from the entire instrument. Individual words and phrases must be considered in connection with the rest of the contract. Contracts should be construed in the light of the circumstances surrounding the parties at the time of the execution of the contract.[4]

(1) Bowser v. Chalifour, 135 N.E. 2d 643, and numerous cases there cited.
(2) Peresipka v. Elgin, Joliet & Eastern Ry. Co., 231 F. 2d 268.
(3) Standard Agencies v. Russell, 135 N.E. 2d 896.
(4) City of Harlan, Iowa v. Duncan Parking Meter Corp., 231 F. 2d 840.

(These summaries of court decisions are prepared by I. Vernon Werbin, New York attorney and civil engineer.)

discover new approach to bridge building:



W. H. Harvie, Michigan Bridge contractor, solves curing problem with VISQUEEN film. Here's what he says: "We fasten VISQUEEN film to a wooden framework built across the underside of the 'I' beams. Makes what amounts to a heating duct. Into these ducts we feed live steam from a salamander. Gives us a perfect cure for freshly poured concrete. What's more, these closures hold the steam in and stay in place even when trains go barrelling through. VISQUEEN film is the best material we've found for the job."

Important! VISQUEEN film is all polyethylene, but not all polyethylene is VISQUEEN. Only VISQUEEN has the benefit of research and resources of

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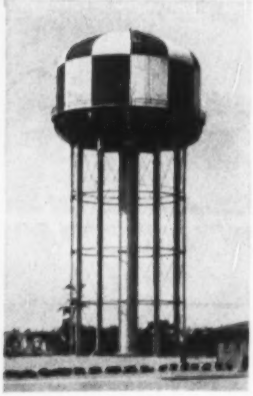

Elevated Steel Tanks by PITTSBURGH-DES MOINES

Latest of the many PDM Elevated Steel Tanks towering over Long Island's level terrain is this 1,500,000-gallon Radial Cone installation for Hempstead. 88 ft in diameter, the tank has a headrange of 35 ft and is on a tower 135 ft to bottom of capacity. Shown at right is an earlier million-gallon PDM tank of the same design, built for Hempstead in 1951.
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Bids Asked—Low Bidders—Contracts Awarded—First Section—

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† **Mass., Chicopee Falls**—SITE WORK—BA 12/19—U. S. Eng., 150 Causeway St., Boston, site work relocation Johnson Rd. and Rose Dr., Westover Air Force Base, ENG-19-016-57-103, $300,000-$400,000. Plans deposit $20, refundable. CD 11/24.

▲† **Massachusetts**—BA On Or About 12/28—U. S. Eng., 111 E. 16 St., New York 3, N. Y., North Adams Flood Control Proj., Unit No. 6, Braytonville, North Adams, CIVENG-30-075-57-12. $4,000,000-$4,500,000. Plans deposit $50. CD 8/21.

▲† **Mass., Chicopee Falls**—CENTRAL HIGH PRESSURE HOT WATER HEATING PLANT—BA 1/4—U. S. Eng., 150 Causeway St., Boston, Zone 14, addn. to central high pressure hot water heating plant and heat distr. sys., Westover Air Force Base, ENG-19-016-57-104. $1,250,000-$1,500,000. Plans deposit $15.

BUILDINGS—BA

R. I., Warren—SUPERMARKET—BA 12/11—Great Scott Food Markets, Inc., 15 Terminal Way, Providence (selected list of bidders) supermarket, Market St. $400,000. Armand G. Caruolo, 985 Hartford Ave., Johnston, archt. CD 9/26.

▲ **Conn., Winsted**—HIGH SCHOOL—BA 12/14—Regional School Dist. 7, Rural Supt., 384 Main St., Winsted, Regional High School and Agricultural Bldg., Barkhamsted, Colebrook, Norfolk and New Hartford. $1,400,000. Plans deposit $100. Louis E. Jallade, 597 5 Ave., New York, N. Y., archt. Bids Oct. 4 rejected. CD 8/28.

Mass., Salem—HOSPITAL—BA 12/18—Salem Hospital, 81 Highland Ave., hospital addn wing, Highland Ave., $900,000. Plans deposit $50, refundable. Extended date. Valtz & Kimberley, Inc., 820 Lynn Fells Parkway, Melrose, archt. CD 11/14

R. I., Providence—TECHNICAL SCHOOL—BA 12/19—State R. I. & Prov. Plants, Purch. Agent, State House, vocational technical school, Corliss Park, R. I. Proj. EDU-1. $600,000. Plans deposit $50. Joseph M. Mosher & Son, Inc., 77 Washington St., archt.-engr.

Mass., Boston—SCHOOL—BA 1/10—City, Dpt. School Bldgs., 26 Norman St., elementary school, Orient Heights, Blackinton, Joyce Cheverus District, $425,000. Plans deposit $100, refundable. Extended date. Desmond & Lord, 6 Beacon St., Boston, archts. CD 11/12.

Conn., Lakeville—DORMITORY—Bids Asked—Hotchkiss School, Lakeville (selected list of bidders) dormitory. $450,000. Ebbets, Frid & Prentice, 762 Asylum Ave., Hartford, archts. A. John Macchi, 57 Farmington Ave., Hartford, engr. CD 11/8.

BUILDINGS—SLC

Conn., Groton—HOTEL—Knott Hotels Corp., 575 Madison Ave., New York, N. Y., soon lets contract 2 story 60-unit frame, brick veneer Groton Inn, Route 1. $600,000. Saltonstall, Morton & Morton, 53 State St., Boston, Mass., archts. CD 11/15.

HEAVY CONSTRUCTION—LB & CA

† **Grand Iron Works, Inc.**, 525 Tiffany St., New York, N. Y., LB Item 1, **$412,800**; Item 2, **$396,000**, est. $400,000. furnishing, fabricating, del. structural steel Dow Air Force Base, ENG-10-016-57-116B, BANGOR, ME. U. S. Eng., 150 Causeway St., Boston, Mass. Bids Nov. 23.

▲ **MASSACHUSETTS**—Commonwealth of Mass., Dpt. P. Wks., 100 Nashua St., Boston,
S & M Constr. Co., Inc., 30 Salmon St., Providence, R. I. CA **$1,088,645**. constr. sect. Mid Cape Hy., incl. 3 span steel stringer bridges, Proj. 328 (6), Brewster and Orleans. Bids Oct. 30, awarded Nov. 20. CD 11/2, under LB.

MASSACHUSETTS—Commonwealth of Mass., Dpt. P. Wks., 100 Nashua St., Boston,
Mass.—**Campanella & Cardi Constr. Co.**, 780 Jefferson Blvd., Warwick, R. I. LB **$616,442**, est. $600,000. hy. and bridge Rte. 6, Marion-Wareham.
Mass.—**Phil Rando & Co.**, 180 Winter St., Lincoln, Mass. LB **$122,032**, est. $150,329. hy. work, Beaver St., Waltham. Bids Nov. 20. CD 11/7 and 11/9.

MASSACHUSETTS—Commonwealth of Mass., Dpt. P. Wks., 100 Nashua St., Boston,
Suburban Excavators, Inc., 4 New Salem St., Wakefield, Mass. LB **$876,950**, est. $900,000. Proj. I-350 (8), Sect. relocation Rte. 28, Andover. Bids Nov. 20. CD 11/14.

▲† **The Arundel Corp.**, Pier 3, foot of Fulton St., Brooklyn, N. Y., CA **$1,710,000**. imprvt. dredging Fall River Harbor, Fall River, CIVENG-19-016-57-29 MASSACHUSETTS, U. S. Eng., 150 Causeway St., Boston, Mass. Bids Nov. 9. CD 11/14, under LB.

▲ **Jefferson Constr. Co.**, 75 First St., Cambridge, Mass. LB Item 1A **$1,243,240**, Item 1B **$1,227,240**, Item 2A **$1,218,252**, Item 2B **$1,214,252**. Item 2C **$1,592,792**. airmen's dormitories, Westover Air Force Base, ENG-19-016-57-81, CHICOPEE FALLS, MASS. U. S. Eng., 150 Causeway St., Boston, Mass. Bids Nov. 26. CD 11/9.

Kirby Constr. Co., Ashland Ave., Manchester, Mass. LB **$571,328**, est. $490,000. L-801 Contr. No. 2, constr. paving auto parking areas, aprons, holding station and fillets Logan Airport, EAST BOSTON, MASS. Commonwealth of Mass., Airport Management Bd., c/o Div. Bldg. Constr., 38 Chauncy St., Boston, Mass. Bids Nov. 20. CD 10/30.

▲† **S. Volpe & Co., Inc.**, 185 Devonshire St., Boston, Mass., LB **$2,403,500**. airmen's dormitories, Otis Air Force Base, ENG-19-016-57-96, FALMOUTH, MASS. U. S. Eng., 150 Causeway St., Boston, Mass. Bids Nov. 27. CD 11/5.

† **The Lane Constr. Corp.**, 965 E. Main St., Meriden, Conn., LB **$945,702**, pavements and utilities, Bradley Field, ENG-19-016-57-74, WINDSOR LOCKS, CONN. U. S. Eng., 150 Causeway St., Boston, Mass. Marchant & Minges, 1007 Farmington Ave., West Hartford, and John J. Mozzochi, 265 Hebron Ave., Glastonbury, engrs. Bids Nov. 27. CD 11/1.

▲† **F. D. Rich Co., Inc.**, 550 Summer St., Stamford, Conn., LB **$1,714,400**. maintenance hangar and base supply warehouse, Bradley Field, ENG-19-016-57-62, WINDSOR LOCKS, CONN. U. S. Eng., 150 Causeway St., Boston, Mass. Bids Nov. 21. (**Correction**-contractors name and amount). CD 11/27, under LB.

BUILDINGS—LB & CA

J. F. Rand & Son, 57 Sudbury St., Boston, Mass. CA **$659,243**. Proj. Mass. 56-C-502 A6, ELEMENTARY SCHOOL, Washington St., AYER, MASS. Town, Town Hall, Ayer, Mass. CD 11/20, under LB.

DeStafano Constr. Co., 319 Chelsea St., East Boston, Mass. LB **$457,000**. Proj. 19-CH-8 (D), DORMITORY, Everett and Oxford Sts., CAMBRIDGE, MASS. Leslie College, 29 Everett St., Cambridge, Mass. Bids Nov. 14. CD 11/8.

▲ **Tocci Brothers Constr. Co., Inc.**, 38 Colonial Ave., Newtonville, Mass. LB **$2,070,995**. HIGH SCHOOL, CANTON, MASS. Town, High School Bldg. Comn., c/o Supt. Schools, High School, Canton, Mass. Bids Nov. 20. CD 11/5.

▲ **Canter Constr. Co.**, 185 Corey Rd., Brookline, Mass. CA Approx. **$1,000,000**. TEMPLE and SCHOOL BLDG., Hammond Pond Parkway, NEWTON, MASS. Temple Mishkan Telfila, 122 Elm Hill Ave., Roxbury, Mass. CD 11/12, under LB.

George E. Emerson, Inc., 34 Britton St., Pittsfield, Mass. CA **$508,000**, est. $500,000. ELEMENTARY SCHOOL, Bushey Rd., PITTSFIELD, MASS. City, 43 East St., Pittsfield, Mass. CD 10/23, under LB.

† **Franchi Constr. Co.**, 216 Webster St., West Newton, Mass. LB **$522,418**, est. $512,050. Army Reserve TRAINING CENTER, American Legion Hy., ENG.-19-016-57-105, ROSLINDALE, MASS. U. S. Eng., 150 Causeway St., Boston, Mass. The Architects Collaborative, 63 Mt. Auburn St., Cambridge, Mass. and Reisner & Urbahn, 660 Madison Ave., New York, N. Y., archts. Bids Nov. 23. CD 11/8.

▲ **Aberthaw Constr. Co.**, 60 State St., Boston, Mass. CA Approx. **$5,000,000**. Total est. cost $15,000,000. four PLANT BLDGS. 400,000 sq. ft. for research and development laboratory, WILMINGTON, MASS. AVCO Corp. and U. S. of A. Dir. of Procurement, Maj. General Davis H. Baker, dir., Air Force Material Command, Wright-Patterson Air Force Base, O., Cabot, Cabot & Forbes, owner's representative, 60 State St., Boston, Mass. Peirera & Luckman, 9220 Sunset Blvd., Los Angeles 46, Calif., archts. Metcalf & Eddy, 1300 Statler Bldg., Boston 16, Mass.

▲ **E. Turgeon Constr. Co., Inc.**, 42 Weybosset St., Providence, R. I., LB **$3,209,972**. COLLEGE OF EDUCATION BLDGS., Bid No. 394 to 401, Proj. No. Rice-23, PROVIDENCE, R. I. State R. I. & Prov. Plants, Div. Purchase, State House, Providence, R. I. Bids Nov. 27. CD 11/7.

▲ **U. S. Eng.**, 150 Causeway St., Boston, Mass., cancelled bids to have been opened Nov. 23, site imprvs., incl. grading, clearing, grubbing, seeding, driveways, roadways, water distr. sys., sanitary disposal, etc., Defense Area, Simsbury, Plainville and East Windsor, ENG-19-016-57-27, CONNECTICUT. CD 11/5.

Wadhams & May Co., 15 Lewis St., Hartford, Conn., CA, **$817,782**, JUNIOR HIGH SCHOOL, Rte. 167, AVON, CONN. Town, Bd. Educ., Old Town Hall, Avon, Conn. Bids Oct. 18. CD 10/24, under LB.

P. Francini & Co. Inc., Water St., Derby, Conn., LB **$425,900** (6 bidders) Proj. BI-B-117, GIRLS COTTAGE No. 18, Southbury Training School, SOUTHBURY, CONN. State P. Wks. Dpt., 165 Capitol Ave., Hartford, Conn. Bids Nov. 21. CD 10/24.

▲ **Vuono Constr. Co.**, 217 Bedford St., Stamford, Conn., CA **$3,000,000**. FACTORY, STAMFORD, CONN. Pitney-Bowes, Inc., 69 Walnut St., Stamford, Conn. Bids Nov. 27. CD 11/9.

▲ **Town, School Bldg. Comn.**, Jessup Rd., Westport, Conn., rejected bids Aug. 29, SENIOR HIGH SCHOOL, North Ave., WESTPORT, CONN. LB **$3,744,000**. Will re-advertise. CD 9/11, under LB.

▲ **DeLuca Constr. Co.**, 27 Crescent St., Glenbrook, Conn., CA **$2,384,000**. OFFICE, STAMFORD, CONN. Dorr-Oliver, Inc., Barry Pl., Stamford, Conn. CD 10/10, under LB.

▲ **Frabrizio & Martin, Inc.**, 55 Railroad Ave., South Norwalk, Conn., LB **$1,010,000**; JUNIOR HIGH SCHOOL, WILTON, CONN. Town, Town Hall, Wilton, Conn. Bids Nov. 20. CD 11/13.

MIDDLE ATLANTIC

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS

BRIDGES
December 20 New York

STREETS AND ROADS
December 20 New York

N. J., Jersey City—BA 12/13—Bd. Freeholders Hudson Co., County Courthouse, constr. county bridge between Hoboken and Weehawken at Park Ave. $790,000. Plans deposit $50. Harris K. Smith, 408 Summit Ave., engr., and Harry Thourot, Court House, co. engr. CD 5/3.

† **New York**—BA On Or About 12/20—U. S. Eng., 11 E. 16 St., New York, Zone 3, Endicott, Johnson City

PROJECTS COVERED

By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger: water supply, earthwork, waterways $44,000; other public works $73,000; industrial buildings $93,000; other buildings $344,000. Also Foreign projects of $100,000 and more in size of interest to American contractors.

By Regions & Classes of Construction

(In order of Listing)

BIDS ASKED
LOW BIDDERS
CONTRACTS AWARDED

New England
Middle Atlantic
South
Middle West
West of Mississippi
Far West

PROPOSED WORK
Water Supply
Sewers, Waste Disposal
Bridges
Streets & Roads
Earthwork, Waterways
Public Buildings
Mass Housing
Commercial Buildings
Industrial Buildings
Unclassified

In These Stages

PROPOSED WORK: **Before and including appointment of engineers or architects.**

BIDS ASKED: BA (new announcements only). For full calendar, see also preceding issues.

SOON LETS CONTRACT: SLC

LOW BIDDERS: LB **On jobs below $500,000 in value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.**

CONTRACTS AWARDED: CA **Except awards to low bidders previously reported in low bidder stage.**

CD dates shown are of Construction Daily Issue in which last previous report was published.

OWNERS, ENGINEERS, ARCHITECTS, CONTRACTORS **are invited to report their new jobs for listing in these reports when they meet or exceed the size minimums shown above. Address these news releases to J. A. Mahoney, REPORTS, ENGINEERING NEWS-RECORD, 330 W. 42 St., New York 36, N. Y.**

Symbols and Abbreviations Include:

†	Federal Government
▲	Project of $1,000,000 or over.
ENR	Engineering News-Record
CD	Construction Daily

For additional reports see Construction Daily.

and Vestal Flood Control Proj., Unit No. 3, Endicott, CIVENG-30-075-57-9, $900,000-$1,100,000. Plans deposit $25.

† **N. Y., Westhampton Beach**—BULK STORAGE FACILITIES—BA On Or About 12/20—U. S. Eng., 111 E. 16 St., New York, Zone 3, bulk storage facilities, transfer pipe line (FY1956) Griffiss Air Force Base, ENG-30-075-57-99. $500,000-$600,000. Plans deposit $25. CD 8/22.

† **New York**—BA On Or About 12/27—U. S. Eng., 111 E. 16 St., New York, Zone 3, Endicott, Johnson City and Vestal, Flood Control Proj. Unit No. 1, Westover, CIVENG-30-075-57-41. $800,000-$1,000,000. Plans deposit $25.

BUILDINGS—BA

N. Y., East Norwich—SCHOOL—BA 12/11—Bd. Trustees Common School Dist. No. 18, East Norwich, James H. Vernon School addn., west side of Pine Hollow Rd. Plans deposit $25 general constr., $15 trades, LaPierre, Litchfield & Partners, 292 Madison Ave., New York, Zone 17, archts.

▲ **Del., Marshallton**—SCHOOL—BA 12/12—Marshallton School Bldg. Com., Marshallton, Wilmington, Junior High School. $1,225,000. G. Morris Whiteside Jr., 909 Tatnall St., Wilmington, archt. Louis H. Doane, Penna R.R. Bldg., Wilmington, engr. CD 4/25/55.

Pa., Greensburg—MUSEUM—BA 12/14—Westmoreland County Museum of Art, Greensburg, 3 story, bsmnt., 40x140 ft., steel brick museum. $500,000, Sorber & Hoone, First National Bank, Greensburg, archts. CD 9/29/53.

▲ **Pa., Pittsburgh**—HOSPITAL—BA 12/15—Children's Hospital, 125 DeSota St., 9 story, bsmnt., brick, hospital addn., alterations. $4,500,000, Alfred Reid & Assocs., 1401 Keystone Bldg., archts. CD 11/3/54.

▲ **N. Y., Brooklyn** — SCHOOL — BA 12/21 — Director Bureau Constr., 42-15 Crescent St., Long Island City, Zone 1, general constr. Sheepshead Bay High School, Batchelder and Coyle Sts. and Aves. X and Y. Plans deposit $35. CD 1/20/55.

▲ **Pa., Altoona**—PLANT—BA 12/21—Sylvania Electric Products Co., 460 Market St., Williamsport, (selected list of bidders,) 1 story bsmnt., 110,000 sq. ft. brick, block mfg. plant. $2,000,000. CD 11/14/55.

▲ **N. Y., Brooklyn** — SCHOOL — BA 12/28 — Director Bureau Constr., 42-15 Crescent St., Long Island City, Zone 1, general constr. Sheepshead Bay High School, Batchelder and Coyle Sts. and Avenues X and Y. Plans deposit $35. Extended date. CD 11/26.

BUILDINGS—SLC

▲ **N. Y., Babylon**—DEPARTMENT STORE—Abraham & Straus, Fulton at Hoyt Sts., Brooklyn, Zone 1, soon lets contract 3 story, 180,000 sq. ft. department store. $2,000,000. John Graham & Co., 444 Fifth Ave., New York, Zone 18, archts. CD 2/21.

HEAVY CONSTRUCTION—LB & CA

Muss & Hirsh, c/o Alwin Cassens Jr., archt., 145 S. Franklin Ave., Valley Stream, N. Y. Owner Builds. **$440,000**. 20 HOUSES on tract at Corporal Kennedy St. and 42 Ave., BAYSIDE, N. Y.

▲ **Brookfield Constr. Co.,** 521 Fifth Ave., New York 17, N. Y., LB Est. **$9,613,003** (7 bidders) grading, paving, utilities, structures and directional signs along Brooklyn-Queens Connecting Hy. between Hamilton Ave. and Concord St., Contr. 5C-6A-9E, BROOKLYN, N. Y. President Brooklyn Boro, Boro Hall, Brooklyn 1, N. Y. Bids Nov. 27. CD 11/16.

▲ **Tully & DiNapoli, Inc.,** 127-50 Northern Blvd., Corona, N. Y., LB **$1,169,688** (5 bidders) constr. pools, landscaping and bridge in Central Terminal area, New York International Airport, Contr. NYA 650.002, IDLEWILD, N. Y. Port of New York Auth., 111 8th Ave., New York 11, N. Y. Bids Nov. 20. CD 10/22.

▲ **Hendrickson Bros., Inc.,** 63 N. Central Ave., Valley Stream, N. Y., LB **$3,693,543** (3 bidders) lateral sewers, Hewlett, Grant Park, Hewlett Point, Bay Park, Angle Sea and Incorporated Villages of East Rockaway and Lynbrook, Town of Hempstead Sewage Collection Dist. 3-Elm Contr. No. 1002-2-ELM-1, MINEOLA, N. Y. County Exec. Nassau Co., Old County Court House, Mineola, N. Y. Bids Nov. 27. CD 11/13.

Tibbetts Contr. Corp., 1 Lawton St., Yonkers, N. Y. LB **$910,950** (7 bidders) Contr. 439, constr. approx. 6 mi. sewers, incl. railroad crossing, 4 stream crossings, manholes and other appurtenances, total of approx. 6 mi. house connections in village of Margaretville and hamlet of Arkville, Town of Middletown, Delaware Co., NEW YORK, N. Y. Bd. Water Supply, 120 Wall St., New York, N. Y. Bids Nov. 27. CD 11/1.

Simpson Constr. Co., Inc., Toms River, N. J., LB **$748,800**. special projects bldg. and parking area, Naval Air Station, NBy 7128, LAKEHURST, N. J., Dpt. Navy, Phila. Naval Base, Phila., Pa. Bids Nov. 20. CD 11/15.

▲ **Glasgow, Inc.,** Glenside, Pa. CA **$1,673,525**. Bid No. 2700, sewers in Third St., Galloway St. and Lawrence St. between Packer and Terminal Aves., Front St. between Pattison and Terminal Aves., PHILA., PA. City, Dpt. Procurement, City Hall Annex, Phila., Pa. CD 11/23, under LB.

Schrader & Seyfreid, 540 Fourth Ave., Bethlehem, Pa., LB **$467,866,** Contr. 1, sewerage sys., SLATINGTON, PA. Boro Council Chambers, Slatington Hose Co. No. 1, 401 W. Church St., Slatington, Pa. Bids Oct. 22. CD 9/13.

▲ **MARYLAND**—State Rds. Comn., 108 E. Lexington St., Baltimore, Zone 2,

Forestville Sand & Gravel Co., and Road Constr Co., 7447 Walker Mil Rd., District Heights, Wash., D. C. LB **$1,185,625** (5 bidders) surf. 3.19 mi. dual hy. State Rte. 205 Briard Ditch to Washington Circumferential Hy., Contr. P 724-13-320, Prince George's Co. Bids Nov. 20. CD 11/19.

Myers & Quigg, Inc., 91 O St. S.E., Wash., D. C., LB **$693,738,** repairing asph. pavements and concrete bases at various locations, WASH., D. C. D. C. Govt., Dpt. Hys., 499 Pa. Ave. N.W., Wash., D. C. Bids Nov. 26. CD 11/19.

BUILDINGS—LB & CA

Forest Del-Mar Apartments, c/o Ingram S. Carner, archt., 71-11 Austin St., Forest Hills, N. Y. Owner Builds. **$400,000**. 6 story APARTMENT, Yellowstone Blvd and Selfridge and Kessel Sts., FOREST HILLS, N. Y.

Fischer-Malik, Inc., Conklin Ave., Farmingdale, N. Y. LB **$900,700**. Site B, **$983,500**. Site D, **$618,800**. Site F, general contract three elementary SCHOOLS, LINDENHURST, N. Y. Bd. Educ., Union Free School Dist. No. 4, town of Babylon, Clerks Office, Junior-Senior High School, 350 Wellwood Ave., Lindenhurst, N. Y. Bids Nov. 1.

▲ **Nathan Blaser,** c/o H. Herbert Lilien, archt., 201 W. 72 St., New York 23, N. Y. Separate Contracts. Est. **$1,000,000**, two 6 story APARTMENTS Webster Ave. and 236 St., NEW YORK, N. Y. CD 5/23.

▲ **Caristo Constr. Co.,** 26 Court St., Brooklyn 2, N. Y. LB **$1,480,000** (11 bidders) general constr., Public School 140, Rivington and Ridge Sts., Manhattan, NEW YORK, N. Y. Director Bureau Constr., 42-15 Crescent St., Long Island City 1, N. Y. Bids Nov. 21. CD 10/24.

▲ **Gross Bros. Corp.,** 380 Madison Ave., New York 17, N. Y. Owner Builds. **$2,500,000**. 19 story APARTMENT, block bounded by 55 St., 56 St., Sutton Place South and East River NEW YORK, N. Y. Gross Bros. Corp., 380 Madison Ave., New York 17, N. Y. CD 3/9.

▲ **Gross Bros. Corp.,** 380 Madison Ave., New York 17, N. Y. Owner Builds. **$4,000,000**. 2nd of two bldgs., 19-story APARTMENT, 54 St., 55 St., Sutton Pl. South and East River, NEW YORK, N. Y. Paul Resnick, 654 Madison Ave., New York 17, N. Y., archt.

▲ **Industrial Engineering Co., Inc., and Kun, Smith & Harris, Inc.,** (joint venture), 101 W. 31 St., New York 1, N. Y. CA **$2,000,000**. altering HOSPITAL at site, NEW YORK, N. Y. Beth Abraham Home, 612 Allerton Ave., New York 26, N. Y. CD 10/8.

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▲ **Turner Constr. Co.**, 150 E. 42 St., New York, N. Y. CA Est. **$50,000,000-$60,000,000**. 60 story, stainless steel OFFICE, Avenue of Americas, W. 51 and W. 52 Sts., NEW YORK, N. Y. John W. Galbreath & Peter B. Ruffin, 150 E. 43 St., New York, N. Y. Harrison & Abramovitz, 630 Fifth Ave., New York, N. Y., archts. Edwards & Hjorth, 67 W. 44 St., New York, N. Y., structural engrs. Jaros, Baum & Bolles, 415 Lexington Ave., New York, N. Y., mech. engrs. Ed. E. Ashley, 10 E. 40 St., New York, N. Y., electrical engrs.

▲ **Wilaka Constr. Co., Inc.**, 11 E. 44 St., New York 17, N. Y., LB **$1,832,000**, (10 bidders) general constr. PUBLIC SCHOOL 2, Pike St., between Henry and Madison Sts., Manhattan Boro, NEW YORK, N. Y. Director Bureau Constr., 42-15 Crescent St., Long Island City 1, N. Y. Bids Nov. 27. CD 11/21.

▲ **Lange-Finn Constr. Co., Inc.**, 522 Broadway, Albany, N. Y., CA **$1,644,500**. general constr. HIGH SCHOOL, SCOTIA, N. Y. Bd. Educ., Central School Dist., Scotia, N. Y. Bids Oct. 24. CD 11/5, under LB.

▲ **Morewood-at-Seaford Homes**, c/o William P. LaVallee, archt., 231 Post Rd., Westbury, N. Y. Owner Builds. **$1,000,000**. 50 HOUSES, on tract at Jackson Ave. and Bayles Rd., SEAFORD, N. Y.

McManus, Longe, Brockwehl, Inc., 65 Arcadia Court, Colonie, N. Y. CA **$735,600**. general constr. JUNIOR-SENIOR HIGH SCHOOL, VOORHEESVILLE, N. Y. Bd. Educ., Central School Dist. 1, Voorheesville, N. Y. CD 11/5, under LB.

P.E.P. Management Co., c/o Lama, Proskauer & Prober, archts., 395 Pearl St., Brooklyn 3, N. Y. Owner Builds. **$475,000**. 6 story APARTMENT, Pettit Ave. between Broadway and Layton St., WOODSIDE, N. Y. CD 2/6.

▲ **J. & L. Constr. Co.**, Schwehm Bldg., Atlantic City, N. J., CA **$1,000,000**. MOTEL, Kentucky Ave. near Boardwalk, ATLANTIC CITY, N. J. Max Malamut Shelburne Hotel, Michigan Ave. and Boardwalk, Atlantic City, N. J. Peter Carver Assoc., 115 Christopher St., New York City, N. Y., engr. CD 9/24.

▲ **Wark & Co.**, 1920 Sansom St., Phila., Pa. CA **$2,000,000**. MILK PROCESSING PLANT and GARAGE, CAMDEN, N. J. National Dairy Products Co., Sealtest Supplies Division, Philadelphia National Bank Bldg., Phila., Pa. CD 9/24.

Albert A. Stier, Inc., 505 Allwood Rd., Clifton, N. J., Owner Builds, **$400,000**. 40-alley BOWLING ALLEYS, Stiertown Shopping Center, Rte. 3 and Bloomfield Ave., CLIFTON, N. J. Emil Schmidlin, 486 Central Ave., East Orange, N. J., archt.

▲ **Albert A. Stier, Inc.**, 505 Allwood Rd., Clifton, N. J., Owner Builds, **$1,275,000**. 44 HOUSES, Hy. 3, Hy. 46 and Valley Rd., Sherwood Forest Development, CLIFTON, N. J. Rudolph Novak, 89 Central Ave., Clifton, N. J., archt.

Matthew Trella, 542 Van Houten Ave., Clifton, N. J., Owner Builds, **$530,000**. 31 HOUSES on tract known as Meadow Lane Homes, off Brighton Rd. and Meadow Lane, CLIFTON, N. J.

John & George Gulya, 11 Gold St., Fords, N. J., Owner Builds. **$400,000**. 25 HOUSES, Meeker Ave., "Meeker Terrace", EDISON TWP., N. J. Peter M. Grygotis, 306 Aldens Rd., Roselle, N. J., archt.

▲ **Harold Snyder**, 706 S. Michigan Ave., Kenilworth, N. J., Owner Builds, **$1,000,000**, 37 HOMES, Dimock Estate tract on North Broad St. and Cross Ave., ELIZABETH, N. J.

Mahony-Troast Constr. Co., 790 Bloomfield Ave., Clifton, N. J., CA Est. **$750,000**. AUDITORIUM and GYMNASIUM on campus, MADISON, N. J. Drew University, Madison Ave., Madison, N. J. Bids Nov. 8. CD 10/31.

▲ **J. Martino**, 17 Melson Pl., Nutley, N. J., Owner Builds, **$1,500,000**, 60 HOMES, Dollwood Dr., Burnham Park section of MORRISTOWN, N. J. Rudolph Novak, 89 Central Ave., Clifton, N. J., archt.

Levitt & Sons, Inc., Levittown, Pa. Separate Contracts. **$500,000**. 1 story, 30,000 sq. ft. brick block, glass ADMINISTRATION BLDG. at N. J. Levittown, RANCOCAS, N. J.

Massett Building Co., 212 N. Georgia Ave., Atlantic City, N. J., CA **$569,860**, 4 story, 54x94 ft., brick, block, cast stone trim HOSPITAL WING, SOMERS POINT, N. J. Shore Memorial Hospital, Somers Point, N. J. Bids Nov. 8. CD 11/29, under LB.

▲ **Anthony J. Piccola**, 100 Obre Place, Red Bank, N. J. Owner Builds. **$1,600,000**. 65 HOUSE development on Riverdale Ave., NEW SHREWSBURY, N. J. Henry F. Labrecuqe, 17 Linden Pl., Red Bank, N. J., archt.

▲ **Harvey A. Turnure**, 5 Corliss Ave., Allenhurst, N. J. Owner Builds. **$3,500,000**. SHOPPING CENTER, between Sycamore Ave. and Red Bank Airport, NEW SHREWSBURY, N. J.

Zephyr Constr. Co., 7412 New Utrecht Ave., Brooklyn 4, N. Y., LB **$787,600** (5 bidders) Contract PN-380.002. Building No. 173 (BOTTLING PLANT) paving and utilities west side of Export St., PORT NEWARK, N. J. Port of New York Auth., 111 Eighth Ave., New York 11, N. Y. Bids Nov. 27. CD 10/29.

▲ **Old Bridge Gardens Corp.**, 1013 Clinton Ave., Irvington, N. J., Owner Builds, **$1,500,000**. 115 HOUSES, third section, Old Bridge Gardens on Old Englishtown Rd., Madison Twp., OLD BRIDGE, N. J. Louis Steuber, 2092 Morris Ave., Union, N. J., archt.

Massett Building Co., 212 Georgia Ave., Atlantic City, N. J., LB **$569,000**, est. $525,000, HOSPITAL WING, SOMERS POINT, N. J. Shore Memorial Hospital, Somers Point, N. J. Bids Nov. 8. CD 11/15.

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MIGHTY MONSTER on the Mississippi

Photo Courtesy of Dravo Corporation, Pittsburgh, Pa.

Standing beside the giant Owen Clamshell is Mr. George S. Covert, Director, Louisiana State Highways

Building the new $65 million Mississippi River Bridge requires the varied skills and services of many contractors, construction men and a vast array of construction equipment.

The noteworthy first phase of this tremendous undertaking was the construction of the four huge piers by DRAVO CORPORATION, PITTSBURGH, PA.

The largest pier will be as high as a 34 story building, with more than half of it under water.

OWEN BUCKETS

were used in sinking caissons for the giant pier foundations

It's difficult to find any big construction project where OWEN buckets are not at work on important digging and material handling operations.

OWEN buckets are built to withstand rugged usage for long periods of time with a minimum of service.

Write for CATALOGS

"A mouthful at every bite"

BUCKETS AND GRAPPLES

THE OWEN BUCKET CO.
6010 Breakwater Avenue • Cleveland, Ohio
Branches: New York, Philadelphia, Chicago, Berkeley, Calif., Fort Lauderdale, Fla.

▲ **Lou Gorsky,** Hyers Ave., Toms River, **N. J.,** Owner Builds, **$1,000,000.** SHOPPING CENTER, 14-acre tract, off South Main St., south of TOMS RIVER, N. J. Paul B. West, 911 N. Main St., Toms River, N. J., archt. John C. Fellows & Sons, 310 Makn St., Toms River, N. J., engrs.

▲ **Louis C. Bowers & Sons, Inc.,** 341 Nassua St., Princeton, N. J., CA Est. **$3,000,000.** turbo-motor division PLANT, Lawrence Twp., TRENTON, N. J. Curtis-Wright Corp., 30 Rockefeler Plaza, New York 20, N. Y. Kuljian Corp., 1220 N. Broad St., Phila., Pa., engrs. CD 7/12.

▲ **Frank H. Taylor & Son,** 235 White Oak Ridge Rd., Shore Hils, N. J., Owner Builds, **$2,200,000.** 50 HOUSES adjoining golf club, to be known as Country Club Hill Estates, UPPER MONTCLAIR, N. J. Wm. Chirgotis, 968 Stuyvesant Ave., Union, N. J., archt.

▲ **Christman Constr. Co.,** 61 Elmwood Dr., Emerson, N. J., Owner Builds, **$1,750,000.** 90 HOMES, 41-acre tract on Van Emden Ave., Mountain View Section, WAYNE TWP., N. J.

J. Martino, 17 Nelson Place, Nutley, N. J., Owner Builds, **$650,000.** 40 HOMES, Bloomfield Ave., WEST CALDWELL, N. J. Rudolph Novak, 89 Central Ave., Clifton, archt.

Westmoreland Constr. Co., Huff Ave., Greensburg, Pa. CA Est. **$453,700.** 3 story, brick, steel DORMITORY, GREENSBURG, PA. Seton Hill College, Greensburg, Pa. Bids Nov. 15. CD 11/8.

▲ **L. D. Building Co.,** P. O. Box 472, Latrobe, Pa. LB **$1,598,300.** 1 story, brick, steel Laura Lamar JUNIOR SENIOR HIGH SCHOOL, HOMER CITY, PA. South Central School Auth., Homer City, Pa. Bids Nov. 14. CD 11/9.

▲ **Graziano Constr. Co.,** 7321 Frankstown Ave., Pittsburgh, Pa. LB **$2,098,000,** est. $2,886,263. 1 and 2 story, steel masonry SENIOR HIGH SCHOOL, MONROEVILLE, PA. Municipal Authority School Dist. of Monroeville, Turtle Creek, Pa. Bids Nov. 19. CD 11/7.

Wark & Co., 1920 Sansom St., Phila., Pa., CA **$950,000.** 1 and 2 story, 54,000 sq. ft., stone, steel spandrel stucco SCHOOL, athletic field, paving, PHILA., PA. Springside School, Norwood and Chestnut Aves., Phila., Pa. Martin Stewart & Noble, 117 S. 17 St., Phila., Pa., archts. Allabach & Rennis, Inc., 16 S. Broad St., Phila., Pa., engr.

J. Getzik & Son, 5000 Ormes St., Phila., Pa. CA **$250,000.** 1 story, 4,000 sq. ft., concrete, steel, brick, block industrial PLANT and OFFICE, PHILA., PA. Jomay Realty Co., c/o general contractor.

▲ **R. M. Shoemaker Co.,** 245 S. 24 St., Phila., Pa. CA **$1,000,000.** 1 story, 200x400 ft. WAREHOUSE; 2 story, brick, structural steel skeleton OFFICE and COOLER BLDG., PHILA., PA. Kraft Food Corp., 500 N. Peshtigo Ct., Chicago, Ill. Bids Sept. 7. CD 9/7.

B. L. Winner Co., Inc., 2440 Maple Ave., Pittsburgh, Pa. CA **$472,000.** 2 story, 80x130 ft., 30x166 ft. HIGH SCHOOL addn., Neville Island, PITTSBURGH, Pa. School Dist. of Neville Twp., Neville Island, Pittsburgh, Pa. CD 9/10, under LB.

▲ **Mathew Lievon Sons,** Lawrence Savings & Trust Bldg., New Castle, Pa. LB **$1,310,000.** 1 and 2 story, brick, steel Junior-Senior High School, SLIPPERY ROCK, PA. Slippery Rock Area Joint School Dist., Slippery Rock, Pa. W. G. Eckles Co., Lawrence Savings & Trust Bldg., New Castle, Pa., archt. CD 12/17/53.

† **Victor R. Beauchamp, Inc.,** 431 Cedar St. N. W., Wash. 12, D. C. CA **$728,890.** BACHELOR OFFICERS' QUARTERS at Naval Powder Factory, INDIAN HEAD, MD. Dist. P. Wks. Office, Potomac River Naval Command, Naval Gun Factory, Wash, D. C. CD 7/11, under LB.

Colwill Constr. Co., 2114 Maryland Ave., Baltimore 18, Md. CA **$810,832.** PATIENTS BLDG. No. 1, Long Term Care Colony, Rosewood State Training School, OWINGS MILL, MD. State, Dpt. P. Imprvts., 506 Park Ave., Baltimore 1, Md. Bids Oct. 25, awarded Nov. 21. CD 11/1, under LB.

Warthen & Ward, 10410 Montgomery Ave., Kensington Md. CA **$520,000** (4 bidders) Addn. No. 3 to Poolesville JUNIOR-SENIOR HIGH SCHOOL, Poolesville, ROCKVILLE, MD. Montgomery Co. Bd. Educ., Rockville, Md. Bids Nov. 15, awarded Nov. 21. CD 11/23.

Morrow Bros., Inc., 2315 N. Charles St., Baltimore 18, Md. CA **$413,689.** concrete, steel, masonry FACTORY and OFFICE, TIMONIUM, MD. The Hoover Electronics Co., North Canton, O. Gaudreau & Gaudreau, 330 N. Charles St., Baltimore 1, Md., archts. CD 11/13.

E. E. Stuller, Taneytown, Md. CA **$747,000.** general constr. 1 and 2 story, masonry JUNIOR HIGH SCHOOL, WESTMINSTER, MD. Carroll Co. Bd. Educ., Westminster, Md. CD 10/16, under LB.

▲ **Charles E. Smith Co.,** 1425 H St. N. W., Wash., D. C. CA **$1,300,000.** 106-unit 8 story concrete, frame, masonry APARTMENT, 2712 Wisconsin Ave. N. W., WASH., D. C. Wisconsin Assn., 1425 H St. N. W., Wash., D. C. Corning & Moore, 1302 18 St. N. W., Wash., D. C., archts.

Charles H. Tompkins, 907 16 St. N. W., Wash., D. C., CA Est. **$575,000.** SCHOOL of International Service and Battelle Memorial LIBRARY, WASH., D. C. American University, Nebraska and Massachusetts Aves. N. W., Wash., D. C. CD 5/8.

▲ **Ernest Di Sabatino & Sons,** 2601 W. Fourth St., Wilmington, Del., CA **$1,809,000.** JUNIOR HIGH SCHOOL, Ogletown, NEWARK, DEL. Bd. Educ., Newark, Del. Bids Oct. 31. CD 11/7, under LB.

Clute Bros., Wyoming, Del., CA **$679,900**. MEDICAL CENTER addn. to mental hospital STOCKLEY, DEL. Delaware Hospital for the Mentally Retarded, Stockley, Del. Bids Nov. 13. CD 11/23, under LB.

SOUTH

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS
BRIDGES
December 13 Florida
STREETS AND ROADS
December 13 Florida

HEAVY CONSTRUCTION—LB & CA

▲ **VIRGINIA**—Commonwealth of Va., Dpt. Hys., Central Highway Office Bldg., 1221 E. Broad St., Richmond,

Va.—**Ames & Webb, Inc.**, P. O. Box 4055, Norfolk 2, Va. LB **$249,035** (3 bidders) c. conc. 2.77 mi. Rte. 168. State Proj. 4864-02; 4875-01. Fed. Proj. F-121-1 (2); F-037-1 (5), Princess Anne Co. and City of Norfolk;

Va.—**Ralph E. Mills Co., Inc.**, P. O. Box 513, Salem, Va., LB **$144,081** (3 bidders) soil aggregate and 115 ft. bridge 1.63 mi. Rte. 682, State Proj. 1380-11-13 Fed. Proj. S-947 (1), Roanoke Co.;

Va.—**Moore Brothers**, P. O. Box 258, Verona, Va., LB **$149,310** (4 bidders) soil aggregate and bridge 3.42 mi. Rte. 634, State Proj. 1397-13-14-19, Fed. Proj S-928 (1), Wise Co.;

Va.—**Charles W. Barger & Con Constr. Co., Inc.**, P. O. Box 778, Lexington, Va., LB **$119,833** (3 bidders) b. conc. 0.42 mi. Rtes. 60, 220. State Proj. 2103-70 (Clifton Forge), Fed. Proj. U-106-1 (1), Alleghany Co.;

Va.—**T. E. Brown Paving Co.**, Windsor, N. C., LB **$299,092** (6 bidders) c. conc. 2.87 mi. Rte. 13, State Proj. 2665-06. Fed. Proj. F-09-1 (3), Northampton Co.;

Va.—**Rogers Bros. Constr. Co.**, Grundy, Va., LB **$100,156** (2 bidders) soil aggregate, bit. surf. tr. 2.44 mi. Rte. 661. State Proj. 1325-10-11. Fed. Proj S-201 (3), Dickenson Co.;

Va.—**Sanford Constr. Co., Inc.**, P. O. Box 427, Sanford, N. C. LB **$403,827** (1 bidder) soil aggregate base four bridges, 1.48 mi. Rte. 695, State Proj. 1344-11-12-13-14-16, Fed. Proj. S-307 (2), Henry Co.;

Va.—**Malpass Constr. Co., Inc.**, 111 W. Berkley Ave., Norfolk 6, Va., LB **$106,545** (3 bidders) soil aggregate and 115 ft. bridge 1.62 mi. Rte. 712. State Proj. 1358-36-36-37-40-49, Fed. Proj. S-SG-47 (2), Mecklenburg Co. Bids Nov. 21. CD 11/9.

▲ **VIRGINIA**—The Richmond-Petersburg Turnpike Auth., 1015 E. Main St., or by mail, P. O. Box 1-R, Richmond, Zone 2,

Wiley N. Jackson Co., P. O. Box 1408, Roanoke, Va. and **Robert T. Main Co.**, P. O. Box 1, Salem, Va., and **Thorington Constr. Co.**, 2106 N. Hamilton St., Richmond, Va., LB **$4,090,149** (joint venture) (5 bidders) Contr. A-5-G, Sect. A, grading, drainage, paving, structures 3.79 mi. from Robin Hood Rd. to US Rte. 301, Richmond City and Henrio Co. Parsons, Brinckerhoff, Hall & Macdonald, 51 Broadway, New York, N. Y., engrs. Bids Nov. 20. CD 11/1.

WEST VIRGINIA—State Road Comn., Charleston, Zone 5,
Keeley Constr. Co., Milford St. Exten., Clarksburg, W. Va. CA **$598,490**. traffic bound base, b. conc. bottom, base and wearing courses 2.249 mi. Woodland-Cresap Rd., F-114 (13), Marshall Co. Bids Oct. 30, awarded Nov. 26. CD 11/5, under LB.

▲ **Burkholder & Burkholder**, 1025 Connecticut Ave. N.W., Wash., D. C., CA **$1,511,000**. Sch. A, landing strip extens., clearing, grading, drainage, Tri-State Airport, HUNTINGTON, W. VA. Tri State Airport Auth., Box 1509, Huntington, W. Va. Bids Sept. 18. CD 9/24, under LB.

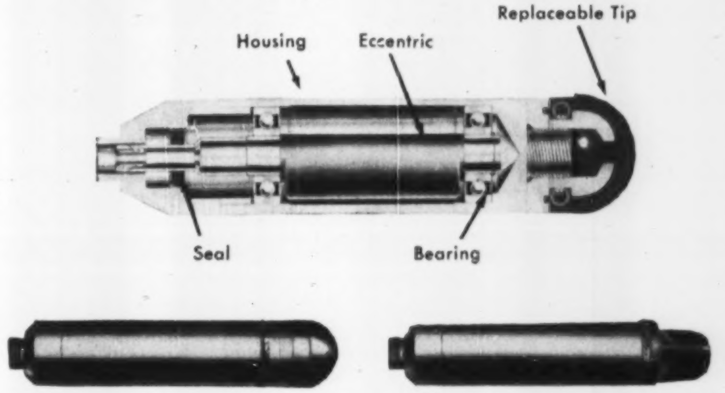
GEORGIA—State Hy. Dpt., No. 2, Capitol Sq., Atlanta,
Cobb Constr. Co., 106 E. Ponce de Leon Ave., Decatur, Ga., CA **$966,315**. wid'n., reconstr., resurf., widen 1 bridge 16.11 mi. Athens-Atlanta Road, State Rte. 8, F-003-2 (3) Barrow and Gwinnett Conuties. Bids Oct. 26. CD 10/31, under LB.

▲† **U. S. Eng.**, 200 East St. Julian St., Savannah, Ga., rejected bids Oct. 9, remedial measures for A.M.C. warehouses, Robins Air Force Base, ENG-09-135-57-18, MACON, GA., LB **$1,095,780**. CD 10/26, under LB.

FLORIDA—State Road Dpt., Tallahassee,
W. L. Cobb Constr. Co., Box 977, Tampa, Fla. CA, **$842,061**. limerock base with b. conc. binder course, 266 ft. double overpass bridges, double underpass bridge, double grade separation over county road, drainage structures, SR 500, FG 002-1 (5), F 0002-1 (6), Jobs 7520-301, 7502-206 and 7702-202, Orange and Seminole Counties. Bids Oct. 11, awarded Oct. 26. CD 10/16, under LB.

FLORIDA—State Road Dpt., Tallahassee,
Smith Eng. & Constr. Co., Drawer 1831, Pensacola, Fla. CA, **$548,495**. east and west approaches for Apalachicola River Bridge 0.474 mi. F-006-3 (5) Job 5302-209 and 5001-204, SR 10, Jackson and Gadsden Counties. Bids Oct. 11, awarded Nov. 27. CD 10/16, under LB.

▲ **FLORIDA**—State Road Dpt., Tallahassee,
Kansas City Bridge Co., 928 Broadway, Kansas City, Mo. CA, **$2,036,973**. substructure for new bridge to replace existing Hathaway Bridge over West St. Andress Bay near Panama City, F-017-2 (11) Job 4602-206, SR 30, Bay Co. Bids Nov. 8, awarded Nov. 27. CD 11/13, under LB.



SIMPLE DESIGN — Short head Viber vibrators are simple in design and have few parts as indicated in cut-away picture above. Head assembly with replaceable rubber tip is shown at left. Assembly with 3-finned steel-cast tip at right.

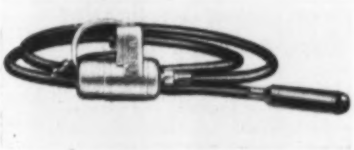
Short Head Viber Vibrators Offer Major Advantages in Placement of Concrete

VIBER VIBRATOR heads are short, easy to manipulate—simple, easy to maintain. Simple construction of the Viber head makes a compact assembly which maneuvers easily around steel and into awkward, hard-to-reach places.

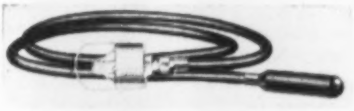
The Viber design utilizes a single eccentric weight in a heat-treated alloy steel housing. Other parts are one bearing at each end of the weight and a grease seal. Viber patented replaceable rubber tip is standard equipment, with 3-finned steel cast tip optional.

Viber heads are light weight, ranging from 6 to 16 pounds ... 11 to 12 inches in length and are available in four diameters—1¾ in., 2⅛ in., 2½ in. and 3 in.

Flexible shaft driven, Viber vibrators are powered by electricity, gasoline or air ... easily adapted to varying job conditions. They are high speed, operating at speeds between 8500 and 11,000 rpm.



Model E Electric



Model P Pneumatic

Model G Gasoline

Viber Replaceable Rubber Tips

Viber rubber tips save contractors thousands of dollars yearly by preventing damage to forms of plywood and other expensive materials. In addition, since most wear on a vibrator occurs on the end of the housing, use of replaceable rubber tips greatly extends housing life.

Viber vibrators are effective. More work can be done in less time and with minimum danger of damage to forms by using the high speed low amplitude type of vibrator pioneered by VIBER.

For complete information on Viber vibrators and address of nearest distributor, write Viber Company, 726 South Flower St., Burbank, Calif. Dept. 7E11.

VIBER

VIBRATORS SINCE 1931

▲ **ALABAMA**—State Hy. Dpt., Montgomery,

A. E. Burgess Co., Inc., 3700 10 Ave. N., Birmingham, Ala. CA, **$1,125,729**. grading, draining, Fed. Aid Proj. I 202 (3) (8), Jefferson and Blount Counties. Bids Oct. 26, awarded Nov. 19. CD 11/5, under LB.

† **A. C. Samford, Inc.**, Albany, Ga., CA, **$872,909**, aircraft control and warning system, ENG-01-076-57-20, EUFAULA, ALA. U. S. Eng., 2301 Grant St., Mobile 7, Ala. Bids Oct. 10, awarded Nov. 19. CD 11/14, under LB.

† **Carr & Rothschild, Inc.**, 1936 Cleveland Ave., Montgomery, Ala., CA **$912,950**. aircraft warning and control sys., ENG-01-076-57-18, THOMASVILLE, ALA. U. S. Eng., 2301 Grant St., Mobile 7, Ala. Bids Oct. 25, awarded Nov. 9. CD 10/31, under LB.

▲† **Robert Simmons Constr. Co., Inc.**, 840 Barrett Ave., Louisville, Ky. LB **$1,867,104**. addnl. facilities Air National Guard Standiford Field, LOUISVILLE, KY. U. S. Eng., 830 W. Broadway, Louisville, Ky. (**Correction** low bidder). CD 11/23, under LB.

C. F. W Constr. Co., Fayetteville, Tenn., CA **$749,452**, new water sys., enlarge present sewerage sys. ETOWAH, TENN. City, Etowah, Tenn. Awarded Nov. 19.

Forcum Lannon, Inc., Clark St., Dyersburg, Tenn., CA **$652,195**, interceptor sewer from Illinois Central R.R. tracks on May St. pumping station, MEMPHIS, TENN. City, City Hall, Memphis, Tenn. Bids Oct. 9. CD 10/16, under LB.

▲† **U. S. Eng.**, Tullahoma, Tenn., rejected bids Oct. 16, constr. removable test section carts for use in supersonic circuit of the propulsion wind tunnel at Arnold Engineering Development Center, ENG-40-126-57-3, TULLAHOMA, TENN. LB **$7,326,200**. CD 10/24, under LB.

BUILDINGS—LB & CA

English Constr. Co., Atla Vista, Va. LB **$437,950**. (6 bidders) Glen Forest Elementary SCHOOL, FAIRFAX, VA. Fairfax Bd. Educ., Fairfax, Va. Bids Nov. 13. CD 10/26.

† **T. A. Loving & Co.**, Bank of Wayne Bldg., Goldsboro, N. C. CA **$671,550**. COMMUNITY CENTER, ENG-31-075-57-21, FORT BRAGG, N. C. U. S Eng., 308 Customhouse, Wilmington, N. C. Bids Nov. 14. CD 11/23, under LB.

Dubose Constr. Co., Kinston, N. C. CA **$414,000**. Northwest Elementary SCHOOL, KINSTON, N. C. Kinston, City Bd. Educ., Court House, Kinston, N. C. Bids Nov. 20. CD 10/31.

▲ **Jones Brothers & Co.**, Wilson, N. C. CA **$1,658,900**. constr. 4 SCHOOLS, WILSON, N. C. City, Wilson, N. C. Bids Sept. 6. CD 9/18, under LB.

▲ **Tidewater Constr. Co.**, North Charleston, S. C. CA, **$20,000,000**. PAPER MILL addn., NORTH CHARLESTON, S. C. West Virginia Pulp & Paper Co., 230 Park Ave., New York, N. Y. CD 10/26/54.

▲ **Power Service Corp.**, Wesley Temple Bldg., Minneapolis, Minn., CA, **$1,029,600**. POWER PLANT addn., KEY WEST, FLA. Utility Bd., 535 Eaton St., Key West, Fla. Bids Nov. 16. CD 10/19.

▲ **C. A. Fielland, Inc.**, Box 2678, N. Rome Ave., Tampa, Fla., LB **$1,300,000**. CITY HALL, W. South St. and S. Orange St., ORLANDO, FLA. City, City Hall, Orlando, Fla. Bids Nov. 21. CD 11/14.

▲ **Ray M. Lee Co.**, P.O. Box 4655, Atlanta, Ga., LB **$1,411,116**, Tallahassee Memorial HOSPITAL addns., TALLAHASSEE, FLA. City, City Hall, Tallahassee, Fla. Bids Oct. 23. CD 10/3.

▲† **J. A. Jones Constr. Co.**, 133 Ellis St. N.E., Atlanta, Ga., CA **$4,280,000**. ARMY BALLISTIC MISSILE AGENCY structure and MECHANICS LABORATORY, Redstone Arsenal, HUNTSVILLE, ALA. U. S. Eng., 2301 Grant St., Mobile 7, Ala. Awarded Nov. 10. CD 10/18.

Blount Brothers Constr. Co., Bell Bldg., Montgomery, Ala., CA **$1,463,000**. 2 story, 60,000 sq. ft. new COMPUTATIONS LABORATORY, Army Ballistic Missile Agency (Huntsville, Ala.).

George A. Caldwell, Box 477, Baton Rouge, La. CA **$919,919** (8 bidders) Proj. AE 6 C-7, SCIENCE BLDG. for Grambling College, GRAMBLING, LA. State Bldg. Auth., State Capitol, Baton Rouge, La. CD 10/31, under LB.

Henry Kappen, 680 Clanora St., Cincinnati, O. CA **$700,000** (4 bidders) 3 story, bsmnt., INFIRMARY, CHAPEL, MELBOURNE, KY. St. Ann Convent Mary, Inglis Hy., Melbourne, Ky. Bids Nov. 7, awarded Nov. 16. CD 11/7.

MIDDLE WEST

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS

BRIDGES

December 11, 12 Michigan

STREETS AND ROADS

December 11, 12, Michigan

ILLINOIS—BA 12/20—Wabash Railroad Co., J. C. Bousfield, ch. engr., 1402 Railway Exchange Bldg., St. Louis 1, Mo., 4 main piers and fender system with concrete ice breakers for proposed vertical lift railroad bridge over Illinois River at Valley City, $450,000. Sverdrup & Parcel, Inc., 915 Olive St., St. Louis 1, Mo., engrs. CD 11/30, under Proposed Work.

Wis., **West Milwaukee**—BA 12/20—Village, 4755 W. Beloit Rd., storm sewers in S. 44th St. $500,000. Steinhagen & Steinhagen, 2735 W. State St., consult. engrs. CD 11/27.

BUILDINGS—BA

▲ O., **Greenville**—PLANT—BA 12/11—Corning Glass Works, Walnut St., Corning, N. Y., 1 story, 265,000 sq. ft. brick, block glass melting plant and railroad siding. $2,000,000. Carroll, Grisdale & Van Alen, 204 W. Rittenhouse Square, Phila., Pa., archts. Day & Zimmerman, 1700 Sansom St., Phila., Pa., engrs. CD 8/30.

Ill., **Chicago**—SCHOOL—BA 12/14—Chicago Bd. Educ., 228 N. La Salle St., 2 story Mary McLeod Bethune School addn., 4401 S. St. Lawrence Ave. $900,000. Holabird Root & Burgee, 180 N. Wabash Ave., archts. CD 6/8.

Ind., **South Bend**—SCHOOL—BA 12/17—School, City of South Bend, 228 S. St. Joseph St., John Marshall School-Broadmoor addn. $625,000. Roy Worden & Assoc., 312 W. Colfax St., archts. CD 7/9.

Ind., **Decatur**—HOSPITAL—BA 12/18-Bd. Trustees, Adams County Memorial Hospital, c/o County Comrs., Courthouse, hospital addn., imprvs. $450,000. CD 8/2.

O., **Berea**—HOSPITAL—BA 12/18—Berea Community Hospital, Front and Bagley Sts., hospital addns., alterations. $850,000. Plans deposit $60. Mellenbrook, Woley & Scott, 20 Beech St., Berea, archts. CD 2/2.

▲ O., **Salem**—HIGH SCHOOL—BA 12/19—Bd. Educ., Salem, high school. $2,585,000. Plans deposit $60. Fulton, Krinsky & DelaMotte, 6014 Euclid Ave., Cleveland, Zone 3, archts. CD 11/14/55.

O., **Austintown** — SCHOOL — BA 12/21 — Austintown School Bd. Educ., Austintown, addns., alterations to Woodside Elementary School, John W. Davis Elementary School and Lloyd Elementary School, $803,000. Plans deposit $25. Kling & Frost, 661 Wick Ave., Youngstown, archts. CD 11/21.

Wis., **Milwaukee**—SCHOOL—BA 12/27—Bd. School Director, 1111 N. 10 St., N. 65th St. School. $700,000. Plans deposit $75. Brust & Brust, 135 W. Wells St., engrs. CD 9/19.

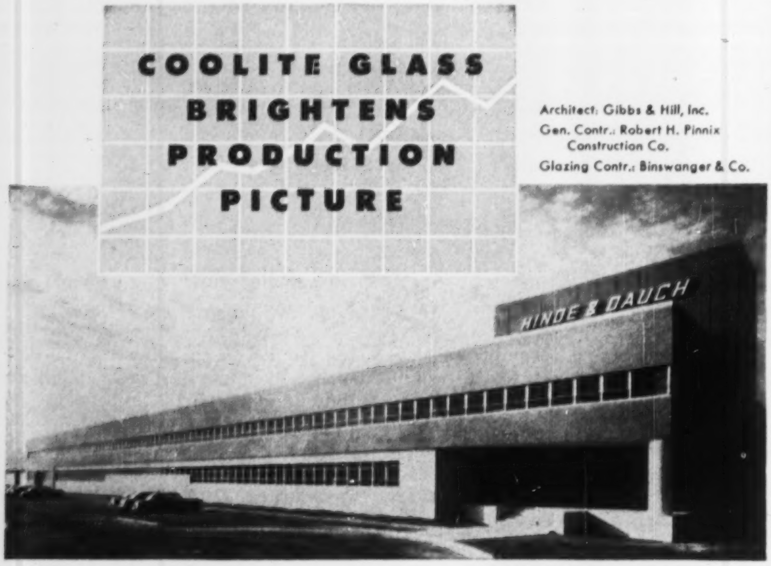
BUILDINGS—SLC

Ill., **Naperville**—SCHOOL—St. Peter & Paul Church, 26 N. Ellsworth St., soon lets contract, 2 story, brick Sunday School and Gym. $450,000. Meyer & Cook, 1915 N. Lincoln Ave., Chicago, archts. CD 8/6.

▲ Ind., **New Albany**—POWER PLANT—Public Service of Indiana, 1100 Main St., Plainfield, soon lets contract superstructure for electric power plant. $1,000,000. Extended date. Sargent & Lundy, 140 S. Dearborn St., Chicago, Ill, engrs. CD 11/12.

HEAVY CONSTRUCTION—LB & CA

Mosser Constr. Co., 122 S. Wilson Ave., Fremont, O. CA **$715,000**, water filtration plant at Mentor-on-the-



Architect: Gibbs & Hill, Inc.
Gen. Contr.: Robert H. Pinnix Construction Co.
Glazing Contr.: Binswanger & Co.

Corrugated Box Plant Achieves Better Daylighting With Heat Absorbing, Glare Reducing Glass

Production efficiency and quality controls benefit from the high levels of natural illumination possible with Coolite. For Coolite, the heat absorbing and glare reducing glass, filters out unwanted elements in "raw" daylight. For example, this modern Hinde & Dauch corrugated box plant, Gastonia, North Carolina, takes full advantage of southern sunshine without distracting, uncomfortable glare and heat. 12000 sq. ft. Coolite, glare reduced both sides for maximum diffusion, is installed in two elevations . . . throws eye-easy daylighting deep into the structure. And since Coolite absorbs up to 50% of unwanted heat rays, the interior remains comfortable while flooded with low cost, natural illumination.

Employees feel better, work better, under Coolite-conditioned daylighting. In your new building or remodeling projects, let light give a lift to production. Specify Coolite by Mississippi . . . the heat absorbing and glare reducing glass that brightens any production picture.

Translucent, light diffusing glass by Mississippi for better daylighting, is available, wired and unwired, in a wide variety of patterns and surface finishes, all scientifically designed to distribute light to best advantage. Available at most leading distributors of quality glass.

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Coolite catalog.
Address Dept. 20.

MISSISSIPPI GLASS COMPANY
88 Angelica St. • St. Louis 7, Mo.
NEW YORK • CHICAGO • FULLERTON, CALIFORNIA

Lake, MENTOR, O. Ohio Water Service Co., Struthers, O. CD 10/11, under LB.

▲ **G. E. Tillman Co., Inc.**, 702 N. Locust St. Centralia, Ill., CA, **$1,894,000,** water pumping and filtration plant, SPRINGFIELD, O. City, City Hall, Springfield, O. CD 10/19, under LB.

R. L. Schutt Co., 1915 N. Meridian St., Indianapolis, Ind., CA, **$644,714** (5 bidders) 4-lane concrete, steel bridge over White River at Kessler Blvd., INDIANAPOLIS, IND. Comrs. Marion Co., Marion County Court House, Indianapolis, Ind. Bids Nov. 15. CD 11/7.

ILLINOIS—State Div. Hys., Springfield,

Ill.—**Rock Island Bridge & Iron Co.**, 1603 Will St., Rock Island, Ill., LB **$80,911** (7 bidders) furnishing steel for 3 bridges, Peoria, Peoria Co.;

Ill.—**Sangamo Constr. Co.**, 700 N. MacArthur St., Springfield, Ill., LB **$113,512** (6 bidders) bridges and approaches SBI 10 east of Jacksonville, Morgan Co.;

Ill.—**Allied Structural Steel Co.**, 20 N. Wacker Dr., Chicago, Ill., LB **$434,820** (3 bidders) furnishing, fabricating, del. steel for Elgin Bridge, Kane Co.;

Ill.—**Eric Bolander Constr. Co.**, Winchester Rd., Libertyville, Ill., LB **$216,530.** substructure for bridge over C.N.W. and Fox River in Elgin, Kane Co.;

Ill.—**Mississippi Valley Structural Steel Co.**, 2100 E. Eldorado St., Decatur, Ill., LB **$117,159** (4 bidders) steel for bridge at Decatur, SBI 48, Macon Co. Bids Nov. 20. CD 11/9.

Gorman & Sons, Inc., P. O. Box 916, Edgemont Station, East St. Louis, Ill., LB **$459,373,** est. $414,036. floodwall and railroad and highway closure structures East St. Louis and vicinity (East Side Levee & Sanitary Dist) Items II-R (1), II-S and II-T, CIVENG-23-065-57-32, Madison and St. Clair Counties, ILLINOIS. U. S. Eng., 420 Locust St., St. Louis, Mo. Bids Nov. 23. CD 10/23.

▲† **Mary Constr. Co., Inc., Cape** Girardeau, Mo., CA **$1,586,499.** Devil's Kitchen Dam, Williamson County, CIVENG-23-065-57-25, ILLINOIS. U. S. Eng., 420 Locust St., St. Louis 2, Mo. Bids Oct. 19, awarded Nov. 15. CD 10/25, under LB.

Coath & Goss, 5103 W. Lake St., Chicago, Ill., CA, **$514,541,** swimming pool, Carver Park, CHICAGO, ILL., Chicago Park Dist., 425 E. 14th Blvd., Chicago, Ill. CD 10/4, under LB.

▲ **Consolidated Constr. Co.**, 101 S. Wells St., Chicago, Ill. LB **$1,321,062.** Spec. 80.77-56-10, railroad overpass, W. Addison St. and N. Lincoln Ave., CHICAGO, ILL. City, City Hall, Chicago, Ill. Bids Nov. 19. CD 11/12.

Louis Scully & Sons, 6127 N. Hiawatha St., Chicago, Ill. CA **$796,336.** Div. 2A, Skokie Interceptor Sewer, Skokie, WAUKEGAN, ILL. North Shore Sanitary Dist., Dahringer Rd., Waukegan, Ill. Greeley & Hanson, 220 S. State St., Chicago, Ill., engrs. Bids Nov. 15. CD 11/27, under LB.

▲ **WISCONSIN**—State Hy. Comn., State Office Bldg., Madison,

Wis.—**Edward Kraemer & Sons**, Plain, Wis., LB **$373,230.** Contract 1, base, structure and c. conc. 0.73 mi. S.T. Hy. 30, Proj. F056-1 (17), Dane Co.;

Wis.—**E & C Co.**, 925 E. Abert Pl., Milwaukee 12, Wis., LB **$723,892.** base, c. conc. 1.415 mi. S.T. Hy. 181 and U. S. 41, Proj. US 0352 (6) and U 03-1 (45), Milwaukee Co. Bids Nov. 20. CD 11/1.

▲ **WISCONSIN**—State Hy. Comn., State Office Bldg., Madison,

Wis.—**Duncan J. McDougall**, Dane, Wis., CA **$153,849.** Contract 1, grading, ballast, structure 4.991 mi. C.T. Hy. "N", Proj. S 0249 (3), Dane Co.;

Wis.—**Schuette Pavers, Inc.**, P. O. Box 321, Manitowoc, Wis., CA **$256,412.** Contract 1, grading, ballast, base course 6.7 mi. S.T. Hy. 29, Proj. S 0439 (3), Brown Co.;

Wis.—**Fletcher Constr. Co., Inc.**, Box 67, Menomonie, Wis., CA **$624,152.** Contract 1, grading, ballast, structures 11.293 mi. S.T. Hy. 29, Proj. F 020-2 (17), Marathon Co.;

Wis.—**Mike Oliver Co.**, 110 E. Washington Ave., Madison 3, Wis., LB **$286,961.** Contract 1, c. conc. base, sheet asph. 0.529 mi. Proj. U 5207 (2), Dane Co.;

Wis.—**N. M. Isabella, Inc.**, 714 Market Pl., Madison, Wis., CA **$670,498.** Contract 1, grading base structures, surf. 1.075 mi. U. S. Hys. 12 and 18, Proj. T 5201 (1), Dane Co. Bids Nov. 20. Grand total $1,991,872. CD 11/1.

▲ **MICHIGAN**—State Hy. Dpt., Stevens T. Mason Bldg., Lansing,

Mich.—**Owen-Ames-Kimball Co.**, 38 Pearl St. N.W., Grand Rapids, Mich. LB **$361,065,** est. $410,000. (9 bidders) rein.-con., steel grade separation bridge on relocated US-131 over Penn R.R. northwest of Moline, M X 1 of 3-5-4 C1-RN (03112), Allegan Co.;

Mich.—**Louis Garavaglia**, 24240 Mound Rd., Center Line, Mich. LB **$901,301,** est. $840,000 (7 bidders) grade separation bridges over Detroit, Toledo & Ironton R.R. and Van Born Rd. 1.25 mi. west of Trenton, BM X1 and BM B5 of 82-1-23 C1-RO, Control Section 82191, Wayne Co.; LB **$478,886,** est. $560,000 (9 bidders) rein.-con. bridge with concrete wearing surf. on Gratiot Ave. over Edsel Ford Expressway, BUI B69 of 82-22-10 C2-UO (UI 391 61), (82025), Wayne Co.;

Mich.—**H. R. Boyd Co., Inc., and L. W. Fitch Co.**, 22285 Michigan St., Dearborn, Mich. LB **$129,378,** est. $140,000. (5 bidders) rein.-con., steel beam bridge on relocation US-23 over Court St. ¼ mi. west of Flint, BIN B6 of 25-7-4 C2-RO (BIN 07-2-5), 25032, Genesee Co.;

Mich.—**Darin & Armstrong, Inc.**, 2041 Fenkell St., Detroit, Mich. LB **$87,362,** est. $90,000. (8 bidders) two pedestrian bridges Rohns and Seminole Ave. over

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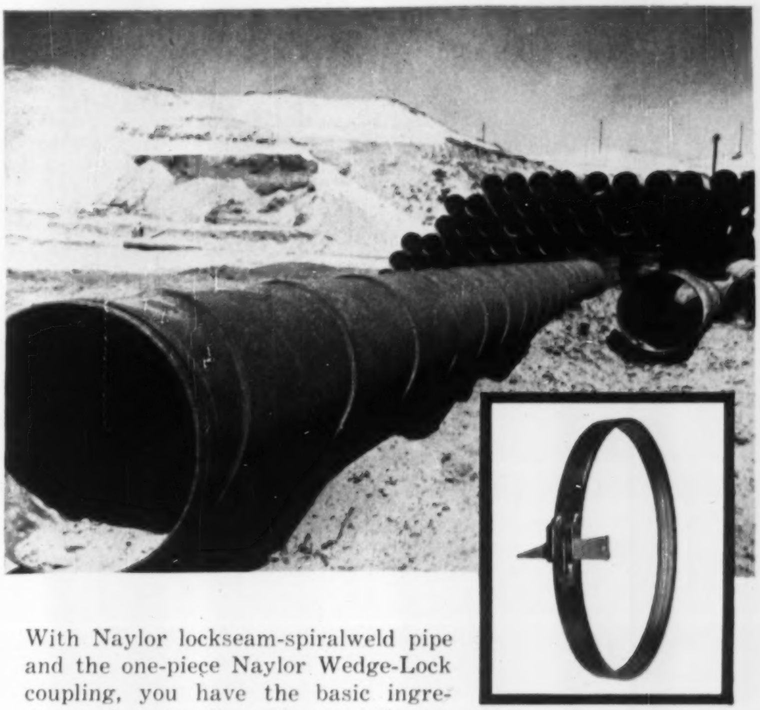

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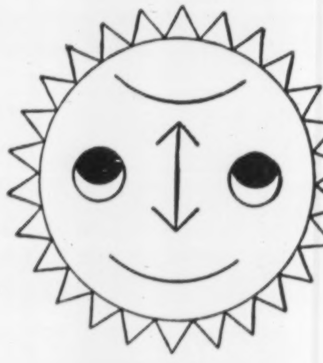

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Edsel Ford Expressway, BI B55 of 82-22-10 C1-UO (I 09-1 14), etc., Wayne Co.; LB **$85,370**, est. $90,000. (8 bidders) two rein.-con. pedestrian bridges on Helen and Townsend Aves. over Edsel Ford Expressway, BI B58 and BI B64 of 32-22-10 C1-UO (109-1 7), (82024), Wayne Co. Bids Nov. 21. CD 11/9 and 11/16.

▲ **MICHIGAN**—State Hy. Dpt., Stevens T. Mason Bldg., Lansing,

Mich.—**L. W. Edison Co.**, 924 Floral Dr. S.E., Grand Rapids, Mich. LB **$2,001,527**, est. $2,240,000. (16 bidders) dual 24 ft. c. conc. 8.427 mi. US-131 from 100 St. south to Wayland, BM 03112 C2-RN (SP 3-56), etc., Kent and Allegan Counties;

Mich.—**Loselle Constr. Co.**, 15351 Goddard St., Wyandotte, Mich. LB **$528,807**, est. $540,000. (18 bidders) dual c. conc. 1.156 mi. relocation of US-23 from Arlene Dr. north to Beecher Rd., BI 25033 C1-RO (SP 25-53), etc., Genesee Co.;

Mich.—**Comstock Constr. Co. & H. C. Shingledecker**, Bay City, Mich. LB **$448,449**, est. $500,000. (14 bidders) aggregate base course, prime and double seal 5.473 mi. on M-9, 9 from Ohio State Line north SS 30031 C1-R (SP 30-15), etc., Hillsdale Co.;

Mich.—**Smith Bros. Excavating Co.**, Cassopolis, Mich. LB **$110,104**, est. $110,000. (9 bidders) 24 ft. aggregate surf. 2.626 mi. FAS Rte. 1128 from US-12 south, CS 81-91 C1 (S 1128 1), Washtenaw Co.;

Mich.—**Sugden & Sivier, Inc.**, 13100 Cloverdale St., Oak Park, Mich. LB **$83,528**, est. $100,000. (5 bidders) 24 ft. aggregate base course, b. conc. wearing 1.509 mi. Kensington Rd. from US-16 south, CS 47-41 C2 (S 1116 2), Livingston Co. Bids Nov. 21. CD 11/9 and 11/16.

▲ **A. J. Etkin Constr. Co.**, 10111 Capital St., Oak Park, Mich. LB **$1,485,213**, est. $1,970,900 (8 bidders) hangar, Detroit-Wayne Major Airport, DETROIT, MICH. Bd. Rd. Comrs. Wayne Co., City-County Bldg., Detroit, Mich. Bids Nov. 20. CD 10/25.

Fattore Co., 6500 E. Eleven Mile Rd., Center Line, Mich. CA **$648,000**. Contr. WS-75D, Coyle 72 in. water main, W. Chicago to Fullerton, DETROIT, **MICH. City, Dpt. Water** Supply, Water Bd. Bldg., 735 Randolph St., Detroit 26, Mich. Bids Oct. 26. CD 9/13.

BUILDINGS—LB & CA

Weithman Bros., Galion, O., CA **$504,800** (4 bidders) general constr. Lincoln Grade SCHOOL and addns. to Norton and Crawford SCHOOLS, BUCYRUS, O. Bd. Educ., Bucyrus, O. **Bids Nov.** 8. CD 10/16.

Malone College, 3201 Euclid Ave., Cleveland 15, O. Separate Contracts, **$600,000**. first five BUILDINGS, CANTON, O. CD 2/8.

▲† **George Rutherford Co.**, 2725 Prospect Ave., Cleveland 15, O. CA **$1,995,000**. general building contract for Nuclear Propulsion LABORATORY, SANDUSKY, O. **National Advisory Committee** for Aeronautics, 1512 H St. N.W., Wash., D. C. CD 9/22/55.

H. L. Vokes Co., 1000 Wayside Rd., Cleveland 19, O., CA Est. **$500,000**. design and construct 1 story, 146 x240 ft. masonry, steel PLANT off Solon Rd. east of S.O.M. Center Rd., SOLON, O. Erickson Tool Co., E. 23 and Hamilton Ave., Cleveland 14, O. Awarded Oct. 25.

▲ **F. H. McGraw Co.**, 111 N. Wabash St., Chicago, Ill., CA Est. **$2,000,000**. FACTORY and OFFICE, BLOOMINGTON, IND. Westinghouse Electric Co., Atomic Power Div., Bettis Field, Pittsburgh, Pa. CD 5/25.

▲ **Fred C. Rowley & Sons**, 4732 Calumet Ave., Hammond, Ind. CA **$2,271,409**. 2 story, bsmnt. technical vocational HIGH SCHOOL addn., HAMMOND, IND., School, City of Hammond, 5935 Hohman Ave., Hammond, Ind. Bids Nov. 13. CD 11/21, under LB.

R. & R. Constr. Co., 735 Park Dr., Alton, Ill. CA **$847,695**. general contract STUDENT UNION and DORMITORY, CHARLESTON, ILL. Eastern Illinois State College, Dr. Richard G. Browne, exec. officer, Charleston, Ill. CD 7/20/50.

▲ **Joseph J. Duffy Co.**, 4994 N. Elston Ave., Chicago, Ill., CA, **$1,235,719**. 2 story, brick Cirspus Attucks Elementary SCHOOL, Pershing Rd. and State St., CHICAGO, ILL. Bd. Educ., 228 N. La Salle St., Chicago, Ill. Bids Nov. 9. CD 11/21, under LB.

Paschen Contrs., Inc., 2739 N. Elston Ave., Chicago, Ill., CA **$572,000**. 2 story, brick, steel, stone concrete FUNERAL CHAPEL, 1031-39 N. Dearborn St., CHICAGO, ILL. Lain & Son, Inc., 316 W. 63rd St., Chicago, Ill. Bids Sept. 6. CD 9/10.

▲ **Briar Constr. Co.**, 285 Walnut St., Des Plaines, Ill., CA, **$2,500,000**, 180 HOMES, Wolf Rd. and Touhy Aves., DES PLAINES, ILL. Owner, c/o contractor.

Hanson & Werhane, 3104 Skokie Valley Rd., Highland Park, Ill. LB **$800,235**. Glencoe West Grade SCHOOL, Dundee and Forest Way Rds., GLENCOE, ILL. School Dist. 35, 1000 Green Bay Rd., Glencoe, Ill. Perkins & Will, 309 W. Jackson Blvd., Chicago, Ill., archts. CD 10/2.

▲ **Power Constr. Co.**, 125 S. Marion St., Oak Park, Ill., CA, **$5,775,250**, Proviso West HIGH SCHOOL, Wolf Rd. between Roosevelt and Harrison Sts., HILLSIDE, ILL. Proviso Twp. High School Dist. 209, 807 S. 1 Ave., Maywood, Ill. Bids Nov. 13. CD 10/12.

▲ **J. Emil Anderson & Son, Inc.**, 1809 W. Balmoral St., Chicago, Ill. CA Est. **$1,700,000**. design and construct 160,000 sq. ft. PLANT addn., LINCOLNWOOD, ILL. Bell & Howell Co., 7100 McCormick Blvd., Lincolnwood, Ill.

▲ **Coath & Goss, Inc.**, 5102 W. Lake St., Chicago, Ill., LB **$2,057,375** **(a)** Longfellow Elementary SCHOOL addn., 315 Jackson Blvd. **(b)** Holmes Elementary

SCHOOL and GYMNASIUM, W. Chicago Ave., OAK PARK, ILL. School Dist. 97, 122 Forest Ave., Oak Park, Ill. Bids Nov. 20. CD 10/22.

R & R Constr. Co., 735 Park Dr., Alton, Ill., CA, **$501,935**, general contract, OFFICE and SIGN SHOP, Div. of Hys. Distr. No. 5, PARIS, ILL. State Div. Architecture & Eng., Armory-Office Bldg. Springfield, Ill. Bids Oct. 22, awarded Nov. 19. CD 10/26, under LB.

▲ **Telander Bros. Constr. Co.**, 8151 S. Western Ave., Chicago, Ill., CA, **$2,000,000**, St. Francis Central Catholic HIGH SCHOOL and Brothers RESIDENCE, W. side Roosevelt Rd., WHEATON, ILL. Christian Brothers, Glencoe, Mo. Bids Nov. 2. CD 10/19.

▲ **W M C Inc.**, 303 Winona St., Winona, Minn., CA Total est. **$1,000,000**. footings and foundations for 68,800 sq. ft. FACTORY, LA CROSSE, WIS. Trane Co., 206 Cameron Ave., La Crosse, Wis. CD 10/3.

▲ **Burger Constr. Co.**, 2406 Mount View Blvd., Wausau, Wis., CA Est. **$1,000,000**. 1 story, part bsmnt., 80x180 ft. steel, brick, block PLANT addn., SCHOFIELD, WIS. Drott Mfg. Co., Kelly Rd., Schofield, Wis. D. Schoepke, 614½ 3 - St., Wausau, Wis., archt.

▲ **T. S. Willis**, 20 E. Milwaukee St., Janesville, Wis., LB **$1,253,838** general contract (only bidder) Union HIGH SCHOOL, WALWORTH, WIS. Bd. Educ., Walworth, Wis. Bids Nov. 14. CD 11/7.

Hunzinger Constr. Co., 4577 N. 124 St., Milwaukee, Wis., CA Total est. **$650,000**. general contract SCHOOL and CONVENT BLDG., WEST ALLIS, WIS. Holy Assumption Catholic Congregation, 1525 S. 71 St., West Allis, Wis. Bids Oct. 26. CD 10/8.

Edward Schendel & Co., 3419 Fort St., Wyandotte, Mich. CA. **$796,872**. general constr. JUNIOR HIGH SCHOOL, Dearborn, INKSTER, MICH. Dearborn Twp. Bd. Educ., Dist. 7, 4650 Mayfair Ave., Dearborn Twp., Mich. CD 11/8, under LB.

Minion Constr. Co., 4571 Washtenaw St., Ypsilanti, Mich. LB **$778,451**. HIGH SCHOOL, MILAN, MICH. Bd. Educ., Milan Area Schools, Alice Smith, secy., Milan, Mich. Bids Nov. 7. CD 10/18.

▲ **Darin & Armstrong, Inc.**, 2041 Fenkell St., Detroit, Mich. LB **$1,168,000**. New ELEMENTARY SCHOOL, Greenfield and 10 Mile Rd., and Francis Scott Key SCHOOL addn., OAK PARK, MICH. City, Bd. Educ., School Dist. No. 3, Oak Park, Mich. Bids Nov. 20. CD 10/29.

Sussex Building Co., 639 Jamaica St., Troy, Mich. Owner Builds. **$675,000**. GERALDINE HEIGHTS, 40 brick HOMES, Rochester and Stephenson Hy., south of 14 Mile Rd., TROY, MICH.

C. H. Reisdorf & Sons, Inc., 9353 Freeland St., Detroit, Mich. LB **$621,900**. general constr. AUDITORIUM and swimming pool addn. to high school, UTICA, MICH. Utica Community School Dist., Bd. Educ., George F. Roberts, secy., Shelby and 21 Mile Rd., Utica, Mich. Bids Nov. 1. CD 9/28.

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BRIDGES

December 11 Iowa **December 13 Kansas**
December 14 Minnesota, Montana, North Dakota

STREETS AND ROADS

December 11 Iowa **December 13 Kansas**
December 14 Minnesota, Montana, North Dakota

▲ **Tex., Galveston**—WAREHOUSE, PIERS—BA 12/17—Galveston Wharves, Port of Galveston, 2402 Avenue C, Pier 30, 32, 33 reconstr. warehouse and piers. $1,000,000. Plans deposit $50. Lockwood, Andrews & Newnam, 1010 Waugh Dr., Houston, engrs. Gene Sembler, c/o owner, ch. engr. CD 2/4/53.

BUILDINGS—BA

Mo., Warrensburg—DORMITORY—BA 12/13—Central Missouri State College, Bd. Regents, James C. Kirkpatrick, chn., Warrensburg, 4 story, 45x250 ft., rein.-con., brick men's dormitory, $450,000, Everitt & Keleti, 4550 Main St., Kansas City 11, Mo., archts. CD 10/26.

▲† **Mo., Kansas City**—FACILITY—BA 12/21—Dist. Pub. Wks. Office, Ninth Naval Dist., Bldg. 1-A, Great Lakes, Ill., Navy-Marine facility, furnish training headquarters, Brush Creek and Benton Blvd. $1,000,000, Kivett & Myers & McCallum, 1016 Baltimore St., Kansas City, Mo., archts.

† **Tex., Medina Base**—BUILDING, etc.—BA 12/27—U. S. Eng., P. O. Box 1229, Galveston, 125 sq. ft. prefabricated metal bldg., approx. 480 lin. ft. chain link fencing and floodlighting for tennis courts; floodlighting for softball diamond; 20x22 ft. wood frame bldg. extens.; approx. 6,000 lin. ft. concrete curb; increase turning radii at approx. 12 street intersections; one 1,000 sq. ft. prefabricated metal shed; 6,600 sq. yd. gravel hardstand; one 375 sq. ft. masonry block bldg.; one 50,000 gal. fuel oil storage tank; approx. 3,000 sq. ft. bowling alley to existing masonry bldg., ENG-41-243-57-5. $100,000-$500,000. CD 8/21, under LB.

Tex., Fort Worth—SCHOOL—BA 1/17—Fort Worth Public Schools Ed. P. Williams, bus mgr., 3210 W. Lancaster St., 1 story masonry Rosedale Park Elementary School. $450,000. Plans deposit $15. Wyatt C. Hedrick Co., 1200 T & P Bldg., archt. CD 5/2.

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BUILDINGS—SLC

Iowa, Davenport—WAREHOUSE, etc.—William F. Brernbrock, archt., Fifth Ave. Bldg., Moline, Ill., soon lets contract 1 story, 45,000 sq. ft. warehouse and office for Pittsburgh Plate Glass Co., 1 Gateway Center, Pittsburgh, Pa. $450,000. CD 9/19.

Neb., Grand Island—HOSPITAL—BA—Lutheran Hospitals & Homes Society, 114 Roberts St., Fargo, N. D. soon lets contract Luthern Memorial Hospital addn. $400,000. McNett & Stanage & Co., Box 362, Grand Island, archt. CD 11/14/55.

Tex., Dallas—OFFICE—BA—State Farm Mutual Auto Insurance Co., 6131 Luther Lane soon lets contract office $700,000. Harwood K. Smith, 1321 Mercantile Bank Bldg., archt. Gregerson & Gaynor, 3010 Blackburn St. and Powell & Powell, 505 N. Ervay St., engrs. CD 5/14.

HEAVY CONSTRUCTION—LB & CA

Irvinbilt Co., Chillicothe, Mo. LB **$499,513**. water sys. imprvs., MOBERLY, MO. City, Moberly, Mo. Bids Nov. 14. CD 10/26.

▲ **NORTH DAKOTA**—State Hy. Dpt., Bismarck,

N. D.—**Schultz & Lindsay Constr. Co.**, 320½ Broadway, Fargo, N. D., CA **$156,527**, tr. serv. grav. 9.009 mi. Proj. F-37 (9), Hettinger Co.;

N. D.—**P. A. Bradbury Constr. Co.**, Wylie Park Rd., Aberdeen, S. D., CA **$417,437**, base, b. conc. surf. 19.729 mi. Proj. S-41 (5) and S-309 (11), Grand Forks Co.; CA **$339,524**, base, b. conc. surf. 16.56 mi. Proj. F-169 (3), Nelson Co.;

N. D.—**Archie Campbell, Inc.**, New Rockford, N. D., CA **$232,077**, Scoria surf. 7.496 mi. Proj. F-350 (10), McKenzie Co.; CA **$277,868**, tr. serv., grav. 18.129 mi. Proj. S-358 (12), McHenry and Sheridan Counties;

N. D.—**Northern Imprvt. Co.**, 633 1st Ave. N., Fargo, N. D. CA **$576,442**, base, b. conc. surf. 26.002 mi. Proj. F-395 (4) and S-262 (8), Morton and Sioux Counties. Grand total $1,999,875. Bids Nov. 16. CD 10/31.

▲ **NEBRASKA**—State Dpt. Roads & Irrigation, Lincoln,

Neb.—**Peter Kiewit Sons Co.**, Omaha Natl. Bank Bldg., Omaha, Neb. CA **$946,633**. paving, culvert, bridge, crushed rock, b. conc. Plattsmouth-Omaha, F—AF-138, FA—F-FG-138, Sarpy Co.;

Neb.—**Roberts Constr. Co.**, 1018 Trust Bldg., Lincoln, Neb. CA **$825,508**. grading, grav., detour, bridges, crushed rock, b. conc. Bennington-Omaha, FA—S-187, SG-187, Douglas Co. Bids Nov. 1. CD 11/9, under LB.

† **Pinebluffs Sand & Gravel Co.**, foot of Nebraska St., Pine Bluffs, Ark. LB **$655,505**. Schedule A, dikes and revetments, Missouri River, Floyd-Lower Dakota Bends, Inv. 25-066-57-47, near Dakota City, NEBRASKA. U. S. Eng., 1709 Jackson St., Omaha, Neb. Bids Nov. 20. CD 11/13.

LaCrosse Dredging Corp., 310 S. Michigan St., Chicago, Ill. LB **$115,928**. Schedule B, Inv. 25-066-57-57. (Nebraska).

▲ **OKLAHOMA**—State Hy. Dpt., Capitol, Oklahoma City, Zone 5,

Okla.—**Fisher Constr. Co.**, Box 801, Norman, Okla., CA **$327,875**, est. $394,365, six concrete, steel bridges, US 270 bypass in Shawnee, Pottawatomie Co.;

Okla.—**Jones & Phillips**, El Reno, Okla., CA **$105,418**, est. $114,758, concrete, steel bridges, Short Creek on US 66 in Sayre, Beckham Co.;

Okla.—**Ottinger Constr. Co.**, 6100 Camp Bowie Blvd., Fort Worth, Tex., CA **$78,346**, est. $81,838, concrete, steel bridge over Deep Fork on county road at Nuyaka, Okmulgee Co.;

Okla.—**J. A. Raines**, 2311 Callahan St., Muskogee, Okla. CA **$964,905**, est. $1,118,539, concrete, steel bridge over North Fork of Red River at Sayre, US 66, Beckham Co.;

Okla.—**Southern Constr. Co.**, 1405 W. Reno St., Oklahoma City, Okla., CA **$143,214**, est. $170,107, concrete, steel bridge, county road west of Shawnee, Pottawatomie Co. Grand total $1,619,758. Bids Nov. 20. CD 11/12.

▲ **OKLAHOMA**—State Hy. Dpt., Capitol, Oklahoma City, Zone 5,

Okla.—**Broce Constr. Co.**, Woodward, Okla., CA **$109,562**, est. $120,524, asph. stabil. base with single bit. surf. 5.823 mi. Hy. 6, north of Granite, Greer Co.;

Okla.—**Brooks & McConnell**, 5020 N.W. 16 St., Oklahoma City 7, Okla., CA **$778,155**, est. $871,598, c. conc. 2.434 mi. US 81, south of Chickasha, Grady Co.;

Okla.—**H. G. Cozad**, Sulphur, Okla., CA **$78,158**, est. $110,862, grade, drain 1.634 mi. Hy. 7 west from US 81, Stephens Co.;

Okla.—**John Erts Constr. Co.**, 2201 Classen St., Oklahoma City 6, Okla., CA **$128,491**, est. $126,376, asph. stabil. base with single bit. surf. 4.98 mi. State Hy. 47 west of Leedy, Dewey Co.; CA **$136,332**, est. $142,468, asph. stabil. base, single bit. surf. 4.939 mi. State Hy. 147, west of Leedey, Dewey Co.;

Okla.—**S. E. Evans**, 2910 "O" St., Fort Smith, Ark., CA **$110,244**, est. $114,687, grade, drain 3.292 mi. Hy. 27, north of Shamrock, Creek Co.;

Okla.—**Fischer Constr. Co.**, Box 801, Norman, Okla. CA **$327,875**, est. $388,254, c. conc. 3.851 mi. US 64 west of Ark. state line, Sequoyah Co.; LB **$351,420**, est. $390,943, c. conc. 3.435 mi. county road west of Enid, Garfield Co.;

Okla.—**Frix & Brisch**, 1200 S. Cherokee St., Muskogee, Okla., CA **$127,862**, est. $122,927, stabil. aggregate base with b. conc. surf. 2.286 mi. US 271 east of Talihina, Leflore Co.; CA **$120,196**, est. $115,163, stabil. aggregate base with b. conc. surf. 2.261 mi. US 271, east of Talihina, Leflore Co.;

Okla.—**Ben Haskins**, Cordell, Okla., CA **$130,903**, est. $175,069, grade, drain 2.558 mi. US 66 west of Sayre, Beckham Co.;

Okla.—**Jeffrey Constr. Co.**, Box 812, Fort Smith, Ark., CA **$148,718**, est. $176,189, grade, drain 3.141 mi. US 69, south of McAlester, Pittsburgh Co.;

Okla.—**Layman & Sons**, 3100 Riverside Dr., Tulsa, Okla., CA **$967,381**, est. $977,185, stabil. aggregate base with b. conc. surf. 3.073 mi. in four lane US 66 bypass east of Yale Ave. in Tulsa, Tulsa Co.;

Okla.—**Pettigrew Constr. Co.**, Box 903, Fort Smith, Ark., CA **$83,928**, est. $107,090, grade, drain 2.819 mi. US 62 east of Boley, Okfuskee Co.; CA **$188,267**, est. $232,173, grade, drainage 5.256 mi. US 62 east from Lincoln county line, Okfuskee Co.;

Okla.—**Smith Bros.**, Noble, Okla., CA **$231,591**, est. $227,407, asph. stabil. base with single bit. surf. 6.987 mi. Hy. 54, north of Weatherford, Custer Co.;

Okla.—**Standard Industries**, 2119 E. 11 St., Tulsa, Okla. CA **$649,001**, est. $631,509, stabil. aggregate base with b. conc. surf. 3.711 mi. US 66 west from Tulsa Co. line, Rogers Co. Grand total $4,668,069. Bids Nov. 20. CD 11/13, 11/12.

TEXAS—State Hy. Dpt., Austin,

Holland Page, P. O. Box 1181, Austin, Tex. CA **$691,603**, flexible base, c. conc. and hot mix b. conc. 1.99 mi. Hy. Loop 217. Proj. I, 1101 (2) and IG, 1101 (3), Tarrant Co. Bids Oct. 17. CD 10/22, under LB.

▲ **TEXAS**—State Hy. Dpt., Austin,

Cage Brothers, 6959 San Pedro St., San Antonio, Tex. CA **$1,664,218**, grading, drainage structures, grade separation structures 7.379 mi. Hy. US 77. Proj. I 230 (4), Denton Co. Bids Oct. 18. CD 10/24, under LB.

▲ **TEXAS**—State Hy. Dpt., Austin,

Tex.—**Austin Bridge Co. & Austin Road Co.**, P. O. Box 1590, Dallas, Tex. CA **$2,478,705**, c. conc. pavement and five highway grade separation structures 8.151 mi. Hy. SH 73. Proj. I 1052 (34), Harris Co.;

Tex.—**B. G. Brown & Co., J. A. Pruitt and T. M. Brown & Sons, Inc.**, P. O. Box 1919, Abilene, Tex., CA **$511,440**, flexible base, b. conc. 13.336 mi. Hy. SH 199. Proj. F 454 (3), F 454 (4) and F 1041 (5), Archer and Young Counties;

Tex.—**Fred Hall & Son**, P. O. Box 488, Valley Mills, Tex. CA **$569,345**, wid'n. structures, add. base, hot mix b. conc. 10316 mi. Hy. SH 31. Proj. F 605 (21) and F 124 (6), McLennan and Hill Counties;

Tex.—**Ivan Dement**, P. O. Box 1787, Amarillo, Tex., CA **$974,329**, c. conc. 2.058 mi. Hy. US 60 and 87. Proj. F 60 (8), Randall Co. Grand total $4,533,819. Bids Nov. 14. Awarded Nov. 20. CD 11/19.

▲ **TEXAS**—State Hy. Dpt., Austin,

Tex.—**Henry L. Stafford**, P. O. Box 1047, Lubbock, Tex. CA **$945,157**, flexible base, b. conc. 16.229 mi. Hy. US 87. Proj. F 60 (11), Randall Co.;

Tex.—**M & N Constr. Co., Inc.**, P. O. Box 12306, Houston, Tex., CA **$1,448,926**, flexible base, b. conc. 8.739 mi. Hy. SH 61 and 73. Proj. I 1052 (35), Chambers Co. Bids Nov 15, awarded Nov. 20. CD 11/20, under LB.

(Continued on page 338)

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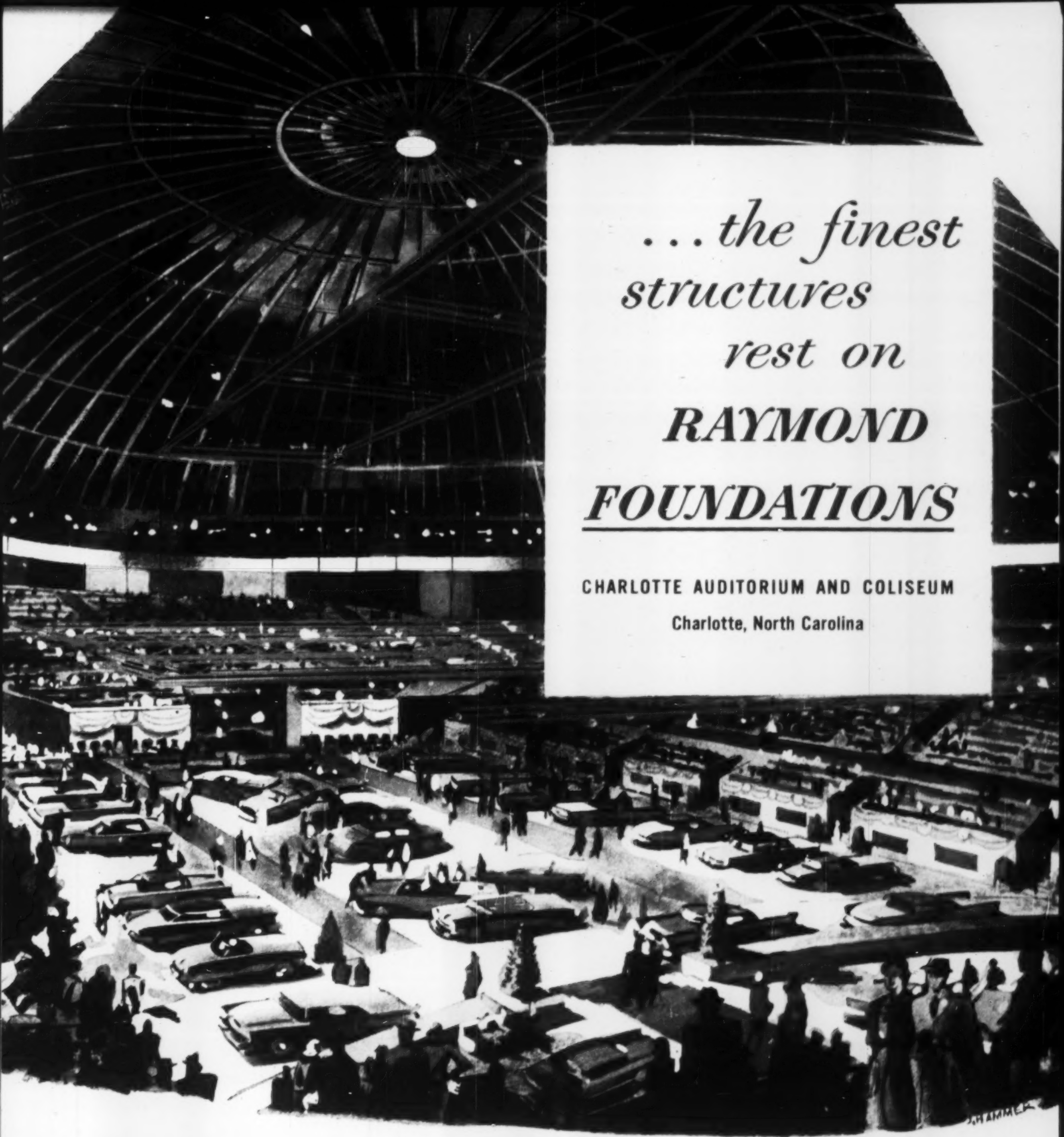

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(Continued from page 336)

▲† **Atlantic, Gulf & Pacific Co.**, 905 Citizens State Bank Bldg., Houston, Tex. LB **$1,013,319.** dredging Washburn Tunnel to Sims Bayou, Harris Co., CIVENG-41-243-57-30, TEXAS. U. S. Eng., Box 1229, Galveston, Tex. Bids Nov. 9. CD 11/1.

Texas Gulf Constr. Co., Bcx 2536, Houston, Tex., CA **$725,651**, total est. $4,500,000. Contr. 3, Pelican Island Causeway bridge over Galveston Channel, GALVESTON, TEX. Bd. Navigation & Canal Comrs., Galveston County Navigation Dist. 1, City Hall, Galveston, Tex. Bids Oct. 16. CD 10/31, under LB.

▲ **City P. Service Bd.**, Navarro and Villita Sts., San Antonio, Tex. Own Forces. **$500,000**, addnl. underground electric cable lines; **$250,000**, installations electric distr. transformers; **$250,000**, gas lines replacement, SAN ANTONIO, TEX. Grand total $1,000,000. CD 1/25.

MONTANA—State Hy. Comn., Helena,

N. A. Nelson Constr. Co., Sheridan, Wyo. CA **$718,051**. Grass Range-Malta, Proj. F-FLH 333 (13), Phillips and Fergus Counties. CD 10/31, under LB.

▲† **Guy H. James Constr. Co.**, Box 9575, Oklahoma City, Okla., LB **$2,095,041**, est. $2,448,508, Helena Valley Tunnel and Canal, Helena-Great Falls Division, Missouri River Basin, Proj. DC 4782, MONTANA. Bureau Reclamation, Dpt. Interior, Govt. Camp, Canyon Ferry, Mont. Bids Nov. 27. CD 10/15.

WYOMING—State Hy. Comn., Cheyenne,

Wyo.—**Stanley H. Arkwright, Inc.**, 1200 6 Ave. N., Billings, Mont., CA **$461,308**, est. $443,261. base, plant mix stone chips, 1 rein.-con. culvert, 4.545 mi. Diversion Dam-Dubois Road, Proj. F 030-2 (1) Fremont Co.;

Wyo.—**Taggart Constr. Co.**, Cody, Wyo., CA **$693,423**. road mix, sand grav. seal 3.123 mi., metal plate guard fence on addn. 2.965 mi. Thermopolis-Shoshoni Rd., F-118 (9) and F-118 (10) F.L.H.P. 12 (2) Comb., Hot Springs Co.;

Wyo.—**W. E. Barling, Inc.**, Meeteetse, Wyo., CA **$590,873**. base, plant mix, one chips, comb. curb and gutter, storm sewer in town of Saratoga, struct. plage stockpasses and misc. work 5.632 mi. Saratoga-Verside Road, F-022 (11), Carbon Co.;

Wyo.—**Knisely-Moore Co.**, Douglas, Wyo., CA **$963,582**, est. $937,802. select material surf., irrigation sprinkler sys., landscaping, 4 rigid-frame bridges 1.269 mi. Cheyenne-Urban Road I-223 (16) Unit I and I-223 (18) Unit I, Laramie Co.;

Wyo.—**Blanchard Constr. Co.**, Derby, Colo., CA **$357,338**. base, plant mix stone chips misc. work 9.218 mi. Albin Connection Road Proj. S-27 (4), Laramie Co.;

Wyo.—**Ryan & Son**, Wheatland, Wyo., CA **$99,232**. spec. emb. misc. work 9.912 mi. Zero Road; SC-CFM 4217, Natrona Co. Grand total $3,165,755. Bids Nov. 20, awarded Nov. 21. CD 11/15.

† **Newport News Shipbuilding & Dry Dock Co.**, Shipyard, Newport News, Va. CA **$608,750**. two hydraulic turbines for Fremont Canyon power plant, Missouri River Basin Proj., Spec. DS 4750, WYOMING. Bureau Reclamation, Dpt. Interior, Denver Federal Center, Denver, Colo. Bids Oct. 16, awarded Nov. 16. CD 10/24, under LB.

▲ **COLORADO**—State Hy. Dpt., 4201 E. Arkansas St., Denver,

Colo.—**C. L. Hubner Co.**, 4200 E. Jewell St., Denver, Colo., CA **$580,118**, est. $608,000. c. conc. paving, plant mix asph. surf., structures 3.998 mi. Colo. Proj. F 0005-3 (12), **Jefferson Co.**;

Colo.—**Dominic Leone Constr. Co.**, Trinidad, Colo., CA **$490,150**. plant mix asph. surf. 4.97 mi. State Hy. No. 6, Colo. Proj. F 001-5 (4), Otero Co. Bids Nov. 21. CD 11/12.

Carruthers Constr. Co., Paola, Kan., CA **$783,964**, sewage treatment plant, BOULDER, COLO. City, City Hall, Boulder, Colo. Bids Oct. 1. CD 10/17, under LB;
Carlson Plumbing & Heating Co., Boulder, Colo., CA **$132,135**, outfall sewer (Boulder, Colo.).

† **Dondlinger & Sons Constr. Co.**, 1206 E. Lincoln St., Wichita, Kan., CA **$727,693**. headquarters bldg. and security force bldg., Air Force Academy Site, No. 05-613-57-5, COLORADO SPRINGS, COLO. Dpt. Air Force, P. O. Box 1670, Colorado Springs, Colo. Bids Nov. 2, awarded Nov. 16. CD 11/15, under LB.

Latimer Constr. Co., 930 Wyandot St., Denver, Colo., CA **$453,330**. Conduit No. 25, 25,700 ft. 60 in. and 5,200 ft. 54 in. water lines, DENVER, COLO. Bd. Water Comrs., City & County Bldg., Denver, Colo. Bids Nov. 19, awarded Nov. 20. CD 11/12.

▲ **Mountain States Constr. Co.**, 9200 W. Colfax St., Denver, Colo., CA, **$3,430,404**. Williams Fork Dam at Granby, DENVER, COLO. Bd. Water Comrs., City & County Bldg., Denver, Colo. Bids Nov. 16, awarded Nov. 20. CD 11/20, under LB.

▲† **Robert E. McKee, General Contractor, Inc.**, Box 562, El Paso, Tex., CA **$1,189,990**, track control and maintenance facilities, Holloman Air Force Base, ENG-29-005-57-33, ALAMOGORDO, N. M. U. S. Eng., Box 1538, Albuquerque, N. M. Bids Oct. 23. CD 11/2, under LB.

BUILDINGS—LB & CA

D. L. Witcher, Inc., Builders Exchange Bldg., Minneapolis, Minn. CA **$542,300**. general constr. 1 story, bsmnt., 165,350 sq. ft. WAREHOUSE addn., HOPKINS, MINN. Red Owl Stores, Inc., Hopkins, Minn CD 11/12, under LB.

Bd. Educ., O. Ellis, clk., Walker, Minn., rejected bids Nov. 8. school addn., WALKER, MINN. CD 10/24.

Adolfson & Peterson, 2817 Bryant Ave. S., Minneapolis, Minn. LB **$413,200**. (12 bidders) general constr., DAIRY INDUSTRY BLDG., ST. PAUL, MINN. Regents of the University of Minnesota, C. A. Smith, purch. agt., 404 Admin. Bldg., St. Paul, Minn. Bids Nov. 20. CD 10/23.

Eugene C. Thumm, 1 Cranberry Lane, St. Louis County, Mo. Owner Builds. Est. **$450,000**. forty-nine 1 story ranch HOUSES, Sect. 3, Berry Meadows Subdivision at Natural Bridge and Carson Rds., CARSONVILLE (ST. LOUIS 21 P. O.), MO.

Charles F. Vatterott Development Co., 10259 St. Charles Rock Rd., St. Ann, Mo. Owner Builds. **$500,000**. 50 RESIDENCES, in DeSmet subdivision on Hy. 140, FLORISSANT, MO.

▲ **Winn-Senter Constr. Co.**, 901 W. 43 St., Kansas City, Mo. CA **$1,600,000**. 98x244 ft. OFFICE 4-level structure, to front 214 ft. on Armour St. allowing setbacks off Armour, Warwick and McGee Sts., KANSAS CITY, MO. International Order of DeMolay, 201 E. Armour St., Kansas City, Mo. Neville, Sharp & Simon, 12 and Walnut Street Bldg., Kansas City, Mo., archts.

Loomis Constr. Co., Potosi, Mo. CA **$541,628**. HIGH SCHOOL, incl. GYMNASIUM, SHOPS, POTOSI, MO. Reorganized School Dist. R-3 of Washington Co., Guy Nixon, clk., Potosi, Mo. CD 10/31, under LB.

Richard J. Young, Erb Rd., St. Louis County, Mo. CA Est. **$750,000**. 30 RESIDENCES, Tamara Terrace subdivision on Sappington Rd. south of Lindbergh Blvd., ST. LOUIS COUNTY, MO. Bender Realtors, 10024 Sappington Rd., St. Louis County 23, Mo.

Swan Constr. Co., 8130 Valcourt Dr., Affton 23, Mo. CA **$497,878**, est. $345,000. ELEMENTARY SCHOOL, Muskey and Tesson Ferry Rds., ST. LOUIS COUNTY, MO. School Dist. R-8, Bd. Educ., Noah Gray, supt. Schools, 4900 S. Lindbergh Blvd., St. Louis County 23, Mo. Bids Nov. 13. CD 11/1.

Murch-Jarvis Constr. Co., 718 Locust St., St. Louis 1, Mo. CA Est. **$500,000**. 3 story, bsmnt., 146x189 ft., brick, steel, concrete EXCHANGE and OFFICE, 5100 Oakland Ave., ST. LOUIS, MO. Merchants Exchange of St. Louis, Harold H. Vegel, chn., 111 Memorial Dr., St. Louis 2, Mo. Burton-Wirth & Assocs., 705 Chestnut St., St. Louis 1, Mo., archts. Otto E. Heinicke & Co., 122 N. Seventh St., St. Louis 1, Mo., engrs. CD 6/12.

▲ **Combustion Engineering, Inc.**, 200 Madison Ave., New York, N. Y., CA Est. **$5,000,000**. chemical recovery unit for PAPER PLANT, CROSSETT, ARK. Crossett Paper Mills, Crossett, Ark. CD 8/6/53.

▲ **M. W. Watson Constr. Co.**, National Bank of Topeka Bldg., Topeka, Kan. CA Total Est. **$16,000,000**. general contract PLANT expansion, addnl. 125,000 sq. ft. brick, steel buildings, TOPEKA, KAN. Goodyear Tire & Rubber Co., 1004 National Bank of Topeka, Topeka, Kan. CD 8/20.

Martin K. Eby Constr. Co., Inc., 610 N. Main St., Wichita, Kan. LB **$898,326**. general constr., I. W. Brook Intermediate SCHOOL, WICHITA, KAN. Bd. Educ., 428 S. Broadway, Wichita, Kan. Bids Nov. 14. CD 11/9.

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▲ **Celanese Corp of America,** 180 Madison Ave., New York, N. Y. Own Forces. **$6,500,000.** POLYOL CHEMICAL UNIT; **$45,000,** site area earthwork, grading; **$200,000,** CHEMICAL STORAGE FACILITIES, BISHOP, TEX. Grand total $6,745,000. CD 11/21.

Lufkin Constr. Co., Box 717, Lufkin, Tex., CA **$528,560.** POWER PLANT, COLLEGE STATION, TEX. A & M College of Texas, College Station, Tex. Bids Nov. 13. CD 11/26, under LB.

Arlington Heights West, Inc., 200 Houston St., Fort Worth, Tex. Owner Builds. **$500,000.** 500 brick, tile HOUSES and SHOPPING CENTER, Denton Hy., FORT WORTH, TEX. **(Correction**—location of project). CD 11/28, under CA, Tex., Port.

▲ **Dow Chemical Co.,** Freeport, Tex. Own Forces. **$11,500,000,** ethanolamines PLANT UNIT, FREEPORT TEX. CD 3/12.

▲ **Texas Technological College,** Lubbock, **Tex.,** cancelled bids to have been opened Dec. 11, MEN'S DORMITORIES, No. 1, **$1,150,000;** No. 2, **$750,000;** No. 3, **$1,000,000;** No. 4, **$1,100,000;** 2 KITCHENS and DINING HALL, **$350,000.** LUBBOCK, TEX. Will re-advertise. CD 11/1.

▲ **Harbor Village Development Corp.,** c/o J. C. French, Texas City, Tex. cancelled bids main SHOPPING CENTER, TEXAS CITY, TEX. Est. **$2,750,000.** Wirtz, Calhoun, Tungate & Jackson, 2506 Richton St., Houston, Tex., archts. CD 9/25.

▲ **San Jacinto Chemical Co.,** c/o San Jacinto Ordnance Depot, Houston, Tex., CA **$1,000,000.** rehabilitation existing chemical PLANT, TEXAS CITY, TEX. Texas City Chemicals (Smith-Douglas Co., Norfolk, Va., parent owner), Texas City, Tex. CD 11/21.

J. C. Boespflug Constr. Co., 502 N. 25 St., Billings, Mont. LB **$443,513.** 2 story bldg., **$517,821.** 3 story bldg. (5 bidders) NEWSPAPER PLANT, BUTTE, MONT. Montana Standard, 69 W. Broadway, and Butte Daily Post, 100 S. Main St., Butte, Mont. Kestle-Godtland-Moyle, 409 Silver Bow Bldg., Butte, Mont., archts.

▲ **Federal Reserve Bank of Kansas City,** 111 17 St., Denver, Colo., rejected bids Sept. 20, 3 story, bsmnt., 68x125 ft. BANK addn., DENVER, COLO. Est. **$1,000,000.** CD 9/17.

FAR WEST

HEAVY CONSTRUCTION—BA

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STREETS AND ROADS
December 19, 20 California

▲ **Calif., Long Beach**—BA 12/20—Long Beach Bd. Harbor Comrs., 1333 El Embarcadero, Long Beach, 6-lane rein.-con. Ocean Blvd. Bridge over Los Angeles River. $4,000,000. James R. Bole, 730 E. 3 St., engr. CD 9/3/54.

▲† **Wash., Spokane** — RUNWAY — BA 12/28 — U. S. Eng., 4735 E. Marginal Way, Seattle, Zone 4, reconstr. and extending Runway 3-21 and extending alert taxiway, Geiger Air Force Base, Inv. 57-81. $1,554,035. Extended date. CD 11/16.

▲ **Wash., Spokane**—BA 1/10—City, City Hall, treatment plant with screen and chlorine bldg., grit chamber bldg., sludge control bldg., sludge pumping bldg. and 3 pumping stations. $1,500,000. Plans deposit $25. Greeley & Hansen, 220 S. State St., Chicago, Ill., engrs. CD 2/28/55.

BUILDINGS—BA

▲ **Wash., Yakima** — CLUB — BA 12/13 — Young Mens Christian Assn., Yakima, 4 story, 87,000 sq. ft., rein.-con. club. $1,600,000. J. W. Maloney, Central Bldg., Seattle, Zone 4, archt. CD 9/5.

Wash., Seattle—CHURCH—BA 12/18—Archbishop of Seattle, 907 Terry St., 94x187 ft. rein.-con. church bldg. $425,000. Plans deposit $50. J. W. Maloney, Central Bldg., Seattle 4, archt. CD 3/14/45.

Calif., Pomona—GYMNASIUM—BA 12/19—State Div. Architecture, 1200 S. Grand Ave., Los Angeles, 1 story, rein.-con., brick, gymnasium and related facilities, Calif. State Polytechnic College, Kellogg Campus, $571,900. Plans deposit $50.

BUILDINGS—SLC

▲ **Calif., Van Nuys**—LABORATORY—Marquardt Aircraft Co., 16555 Santicoy St., soon lets contract. Contract 3, electrical work, foundations for testing cells in jet laboratory modernization. $1,500,000. Norman Eng. Co., 321 S. Robertson Blvd., Beverly Hills, engr. CD 3/19.

Calif., Van Nuys—OFFICE—Ted Leff, 6850 Van Nuys Blvd., soon lets contract 3 story masonry, steel glass office bldg., 6850 Van Nuys Blvd. $400,000. MacDonald & Parsons, 321 S. San Vicente Blvd., Los Angeles, archts.

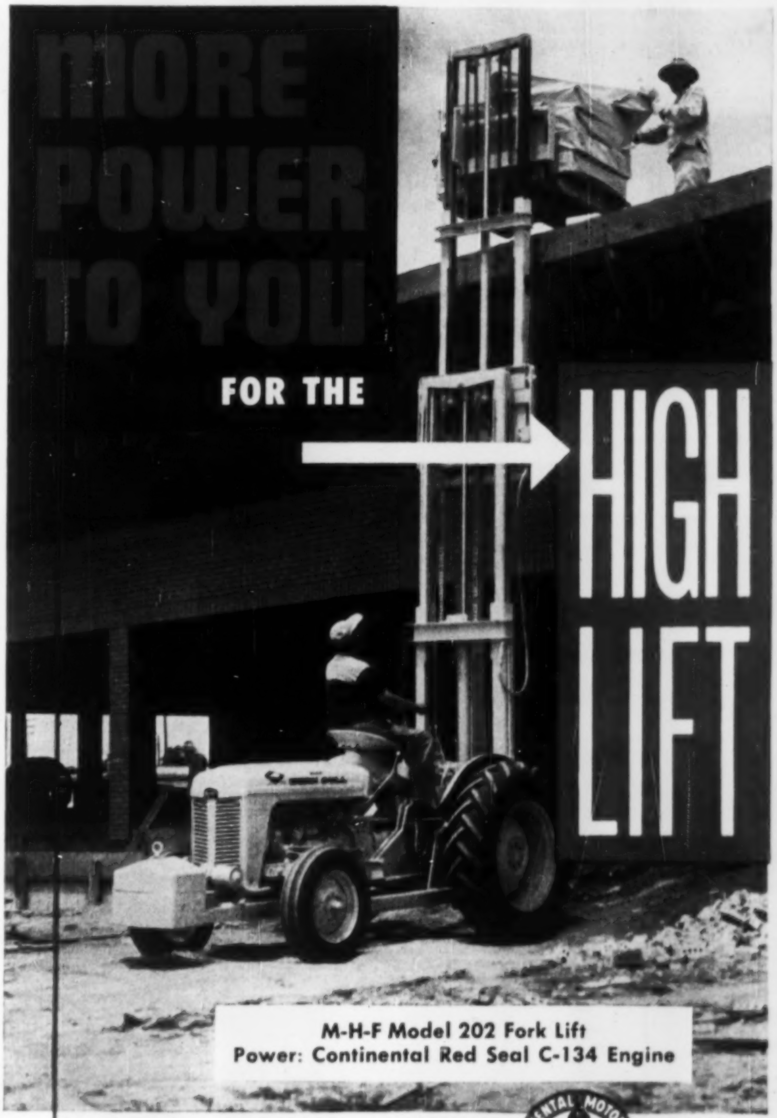
HEAVY CONSTRUCTION—LB & CA

ARIZONA—State Hy. Dpt., 1739 W. Jackson St., Phoenix,

Wallace & Wallace, 1700 S. 19 Ave., Phoenix, Ariz. CA **$584,618.** select material aggreg. base, bit. surf. 5.4 mi. Phoenix Payson Hy. S 338 (3) Maricopa Co. CD 10/24, under LB.

▲ **ARIZONA**—State Hy. Dpt., 17 Ave. and Jackson St., Phoenix,

Peter Kiewit Sons Co., 2112 E. Indian School Rd., Phoenix, Ariz., CA **$1,983,659.** 1,400 ft. Mule Pass



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Tunnel, **U. S. 80, Cochise Co. Bids Nov. 13,** awarded Nov. 25. CD 11/23, under LB.

† **Ward Constr. Co. & Alton V. Phillips Co.,** 4055 21 St. W., Seattle, Wash., LB **$847,385** (3 bidders) Brewster Flat pumping plants, discharge lines and switchyard, Chief Joseph Dam Proj., Foster Creek Div., Spec. DC 4766, WASHINGTON. Bureau Reclamation, Dpt. Interior, Bridgeport, Wash. Bids Nov. 20. CD 11/15.

▲ **S. Morgan Smith Co.,** Lincoln and Hartley Sts., York, Pa. LB **$11,737,025.** (3 bidders) 7 turbine units and associated equipment for Rocky Reach hydro project, Wenatchee, WASHINGTON. Chelan County Public Utility Dist., 327 N. Wenatchee Ave., Wenatchee, Wash. Bids Nov. 19. CD 10/17.

Warren Northwest, Inc., Box 5072, Portland, Ore., CA **$554,204.** parking area, apron paving, Portland International Airport, PORTLAND, ORE. Port of Portland, Swan Island, Portland, Ore. Bids Nov. 8, awarded Nov. 19. CD 11/20, under LB.

† **M. W. Brown,** P.O. Box 827, Redding, Calif., CA **$696,866,** earthwork, structures, surf. for connecting access road, Hy. 299 to Trinity River Crossing, Central Valley Proj. Spec. DC 4770, CALIFORNIA. Bureau Reclamation, Dpt. Interior, Weaverville, Calif. Bids Oct. 23. CD 10/29, under LB.

▲ **CALIFORNIA**—State Div. Hys., 1120 N St., Sacramento,

Griffith Co., 1060 S. Broadway, Los Angeles 15, Calif., CA **$1,229,782** grading, surf., 1.7 mi. steel girder bridge on U. S. 80, San Diego Co. Bids Nov. 8, awarded Nov. 12. CD 11/12, under LB.

▲ **CALIFORNIA**—State Div. Hys., 1120 N. St., Sacramento,

Madonna Constr. Co., P. O. Box 910, San Luis Obispo, Calif., LB **$1,116,474** (5 bidders) grading, paving 3.1 mi. 4-lane divided freeway U. S. 101, San Luis Obispo Co. Bids Nov. 21. CD 10/25.

▲ **CALIFORNIA**—State Div. Hys., 1120 N St., Sacramento,

C. K. Moseman, 727 Barron Ave., Redwood City, Calif., CA, **$1,939,610.** bridge and grading west approach on Garden Highway across Feather River at Nicolaus, Sutter Co. Bids Nov. 7, awarded Nov. 23. CD 11/12, under LB.

▲ **CALIFORNIA**—State Div. Hys., 1120 N St., Sacramento,

E. L. Yeager Co., P.O. Box 87, Riverside, Calif. CA **$1,689,517.** grading, paving 1.4 mi. Freeway with frontage roads, ramps and interchanges, 7 bridges, Sign Rte. 18, San Bernardino Co. Bids Nov. 15, awarded Nov. 23. CD 11/19, under LB.

▲ **CALIFORNIA**—State Div. Hys., 1120 H St., Sacramento,

Gordon H. Ball and Ball & Simpson, 685 Delaware St., Berkeley, Calif., CA **$6,419,253,** constr. 9.9 mi. freeway with frontage roads, ramp and interchanges for constr. 14 bridges and 1 pumping plant, Eastshore Freeway between Warm Springs Jct. and Beard Rd., Alameda Co. Bids Nov. 7, awarded Dec. 26. CD 11/9, under LB.

Ralph Larsen & Son, 64 South Park St., San Francisco, Calif., CA **$520,500.** 1 story, rein.-con., marble interior MAUSOLEUM addn. at Holy Cross Cemetery (3820 crypts), COLMA, CALIF. Roman Catholic Archbishop of San Francisco, 445 Church St., San Francisco, Calif., Wilton Smith, 2143 Lombard St., San Francisco, Calif., archt.

R. V. Lloyd & Co., P. O. Box 391, Coachella, Calif., CA **$705,018,** Sch. I, Interceptor I and tributary sewers, FONTANA, CALIF. City Council, City Hall, Fontana, Calif. Bids Oct. 9. CD 10/17, under LB.

Ralph Larsen & Son, 64 South Park St., San Francisco, Calif., CA **$211,700.** 1 story, rein.-con., marble interior MAUSOLEUM addn. at Holy Sepulchre Cemetery (1416 crypts) HAYWARD, CALIF. Roman Catholic Archbishop of San Francisco, 445 Church St., San Francisco, Calif. Wilton Smith, 2143 Lombard St., San Francisco, Calif., archt.

▲† **Diversified Builders, Inc.,** P.O. Box 390, Montebello, Calif. CA, **$1,080,000,** est. $1,000,000. ground ballastics range, Naval Ordnance Test Station, China Lake, Spec. 4198-56, INYOKERN, CALIF. Eleventh Naval Dist., 1220 Pacific Hy., San Diego, Calif. Bids Nov. 1, awarded Nov. 15. CD 11/8, under LB.

John Strona Co., 3613 Philadelphia St., Pomona, Calif., CA **$954,286,** est. $1,000,000. bridge and imprv. Slauson Ave. between Passons Blvd. and Millergrove Dr., LOS ANGELES, CALIF. Los Angeles Co., Hall of Records, Los Angeles, Calif. Bids Nov. 13, awarded Nov. 20. CD 11/19, under LB.

Noyes Roach Co., 5017 Telegraph Rd., P. O. Box 6877, Los Angeles 22, Calif., LB **$576,400** (4 bidders) equipment repair yard, 2513 E. 24 St., LOS ANGELES, CALIF. Bd. P. Wks., City Hall, Los Angeles, Calif. Bids Nov. 10. Daniel, Mann, Johnson & Mendenhall, 3325 Wilshire Blvd., Los Angeles, Calif., archts.

† **J. F. Cummins,** 245 E. Olive Ave., Burbank, Calif., CA **$700,469.** 8 airmen's DORMITORIES, Edward Air Force Base, ENG-04-353-57-25, MUROC, CALIF. U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif. Bids Oct. 1, awarded Oct. 31. CD 10/31, under LB.

Radich & Fergusson and Martin F. Kordick, P. O. Box 67, Burbank, Calif., LB **$346,175** (28 bidders) Spec. I-AE, Grove Ave. Outfall sewer, Ontario-Upland, ONTARIO, CALIF. City Council, City Hall, Ontario, Calif. Bids Nov. 20. CD 11/7.

Claremont Contractors, 911 E. Foothill Blvd., Claremont, Calif., LB **$136,098,** 75x105 ft., rein.-con. swimming pool, bath houses, POMONA, CALIF. City Council, City Hall, Pomona, Calif. Bids Nov. 20. Amon Randall, 341 W. Orangegrove Ave., Pomona, Calif., archt.

† **Continental Constr. Co.,** P. O. Box 2551, Sacramento, Calif., CA **$643,440.** (6 bidders) special weapons bldg., supersonic training bldg., Mather Air Force Base, ENG-04-16757-21, SACRAMENTO, CALIF. U. S. Eng., 1209 8 St., Sacramento, Calif. Bids Nov. 20. CD 11/27, under LB.

† **Continental Constr. Co.,** 4671 24 St., Sacramento, Calif., LB **$643,440,** est. $648,610. (6 bidders) special weapons bldg., supersonic training bldg. addn. Mather Air Force Base, ENG-04-167-57-21, SACRAMENTO, CALIF. U. S. Eng., 1209 8 St., Sacramento, Calif. Bids Nov. 20.

† **Smale & Robinson and R. E. Staite,** 1033 Avalon Blvd., Wilmington, Calif., LB **$123,500.** repairing quay wall, Naval Air Station, North Island, NBy 7458-56, SAN DIEGO, CALIF. Eleventh Naval Dist., 1220 Pacific Hy., San Diego, Calif. Bids Nov. 20. CD 8/27.

Elmer J. Freethy, 1432 Kearny St., El Cerrito, Calif., CA **$261,289,** 1 story, rein.-con., marble interior MAUSOLEUM addn. at St. Joseph's Mausoleum (1584 crypts) SAN PABLO, CALIF. Roman Catholic Archbishop of San Francisco, 445 Church St., San Francisco, Calif. Wilton Smith, 2143 Lombard St., San Francisco, Calif., archt.

Shepherd & Green, American Trust Bldg., Stockton, Calif., CA **$280,147.** 1 story, rein.-con. mausoleum addn. San Joaquin Cemetery, STOCKTON, CALIF. Roman Catholic Archbishop of San Franciso, 445 Church St., San Francisco, Calif. Wilton Smith, 2143 Lombard St., San Francisco, Calif., archt.

BUILDINGS—LB & CA

▲† **H. K. Ferguson Co.,** 74 New Montgomery St., San Francisco, Calif. CA Est. **$1,551,000.** constr. FUEL ELEMENT CUTTING FACILITY in connection with chemical processing plant and engineering test reactor critical facility, National Reactor Testing Station, Contr. AT (10-1)-844, ARCO, IDAHO. Atomic Energy Comn., Idaho Operatons Office, Idaho Falls, Idaho. CD 3/24/49.

▲† **P. Hardeman, Inc.,** 10955 W. Pico Blvd., West Los Angeles, Calif. CA **$1,580,000.** BUILDINGS, utilities, facilities, in SPERT III area at National Reactor Testing Station, AT (10-1)-849, ARCO, IDAHO. Atomic Energy Comn., Idaho Operations Office, Idaho Falls, Idaho. Bids Nov. 16. CD 11/23, under LB.

Dahlgren Constr. Co., 1700 21 Ave. S., Seattle, Wash., LB **$414,281** general contract 10 masonry, steel Lynndale Elementary SCHOOL bldgs., EDMONDS, WASH. School Dist. 15, Edmonds Wash. Bids Nov. 20.

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Union St. Corp., 1400 Hubbel Pl., Seattle, Wash., Day Labor, **$700,000.** APARTMENT addn., SEATTLE, WASH. CD 10/17.

▲ **Viesko & Post,** Box 69, Salem, Ore., LB **$2,716,260** (2 bidders) Waldo JUNIOR HIGH SCHOOL and Judson JUNIOR HIGH SCHOOL, SALEM, ORE. Salem School Dist., 1309 Ferry St., Salem, Ore. Bids Nov. 23. CD 11/12.

William C. Crowell, 170 E. California St., Pasadena, Calif., LB **$535,120.** (13 bidders) reinforced brick Citrus Ave. SCHOOL, AZUSA, CALIF. Gladstone School Dist., 17260 E. Arrow Hy., Covina, Calif. Bids Nov. 15. CD 11/5.

▲ **Culligan Development Co.,** 3700 E. Camino Real, San Mateo, Calif., Owner Builds. **$3,500,000.** 132 HOME SUBDIVISION, Belcrest Gardens, BELMONT, CALIF.

William Roth Jr., P. O. Box 827, Belmont, Calif., CA **$750,000.** 80,000 sq. ft. frame SHOPPING CENTER, Alameda le Las Pulgas and Ralston Aves., Carlmont Village, BELMONT, CALIF. Carlmont Village Shopping Center, c/o Peter Kump, archt., 1075 Curtis St., Menlo Park, Calif.

John E. Branagh & Son, 42 La Salle St., Piedmont, Calif., CA **$782,000.** 4 story, rein.-con. LABORATORY, University of California, BERKELEY, CALIF. University of California, Administration Bldg., Berkeley, Calif. Awarded Nov. 29. CD 11/8, under LB.

G. A. Cordingly, 405 N. Bedford Dr., Beverly Hills, Calif. Owner Builds. **$700,000.** brick MEDICAL BLDG., 435 N. Bedford Dr., BEVERLY HILLS, CALIF. Martin Stern, Jr., 8325 Wilshire Blvd., Beverly Hills, Calif., archt. Bids Nov. 11, awarded Nov. 20.

▲† **Price McNemar Constr. Co.,** 8601 N. Sepulveda St., Sepulveda, Calif. LB **$1,310,000.** (10 bidders) 5 concrete buildings at Permanent U. S. NAVAL FACILITY, CENTERVILLE BEACH, CALIF. Dist. P. Wks. Office, Twelfth Naval Dist., San Bruno, Calif. Bids Nov. 21. CD 10/24.

▲ **Myers Brothers Constr. Co.,** 3407 San Fernando Rd., Los Angeles Calif. and **H. C. Smith Constr. Co.,** 2900 Rowena Ave., Los Angeles, Calif. CA Est. **$5,000,000.** general contr. vitr. clay sewer pipe PLANT, CORONA, CALIF. Gladding McBean & Co., 290 Los Feliz St., Los Angeles, Calif. CD 7/17, under Calif, Los Angeles.

Selcrest & Fish, 1909 W. Whittier Blvd., Whittier, Calif., CA est $350,000 **$654,316.** reinforced brick, concrete Colimar Rd. SCHOOL, EAST WHITTIER, CALIF. East Whittier School Dist., 114535 E. Whittier Blvd., East Whittier, Calif. Bids Oct. 17. CD 10/23, under LB.

Haas & Haynie, 275 Pine St., San Francisco, Calif. Owner Builds. **$500,000.** 40,000 sq. ft., rein.-con. OFFICE BLDG., FRESNO, CALIF. Pacific Telephone & Telegraph Co., lessee.

D. L. Faull, 1236 Cleveland St., Santa Rosa, Calif. Owner Builds. **$800,000.** 59 HOME subdivision, White Gates Manor, HEALDSBURG, CALIF.

Ernest W. Hann, 219 S. Hawthorne Blvd., Hawthorne, Calif. LB **$631,443,** est. $350,000 (6 bidders) 60-bed reinf. masonry Morningside HOSPITAL, LOS ANGELES, CALIF. Morningside Hospital Center, Western and Manchester Sts., Los Angeles, Calif. Bids Nov. 16. CD 11-19.

H. B. Nicholson, 880 E. Colorado St., Pasadena, Calif., LB **$989,000.** Narbonne HIGH SCHOOL addn. LOS ANGELES, CALIF. Bd. Educ., 1425 S. San Pedro St., Los Angeles, Calif. Bids Nov. 15. CD 4/8/55.

Hillcrest Rentals, 6701 S. Main St., Los Angeles, Calif. Owner Builds. **$500,000.** 20 stucco APARTMENT BLDGS., 1801-43 Manhattan Beach Blvd., MANHATTAN BEACH, CALIF. Bids Nov. 16, awarded Nov 19.

Austin Co., 16112 Euclid St., Cleveland, O. CA **$900,000.** design and construct 1 story, 90,000 sq. ft. FACTORY and OFFICE to mfg conveying and elevating equip., MONTEBELLO, CALIF. Link Belt Co., 307 N. Michigan Ave., Chicago 1, Ill.

▲ **Pacific Coast Builders,** 1 South Park St., San Francisco, Calif., LB **$1,056,400** (7 bidders) Redwood JUNIOR HIGH SCHOOL, NAPA, CALIF. Napa Union High School Dist., Napa, Calif. Bids Nov. 20. CD 10/31.

Hoefer Constr. Co., 16645 Orange Way, Fontana, Calif., LB **$458,780,** JUNIOR HIGH SCHOOL, south of 4 St. between Vernon and Benson Ave., ONTARIO, CALIF. Ontario School Dist., 950 West "D" St., Ontario, Calif. Bids Nov. 20. CD 11/8.

Hunny Investment Co., 9026 E. Las Tunas Dr., Temple City, Calif., Owner Builds, **$403,000.** 47 frame, stucco DWELLINGS, E. Orange Ave., Blackwood St., Sandia Ave., Sauder St., and Sandsprings Dr., PUENTE, CALIF.

Evanwood Homes, Inc., 414 E. Merced Ave., West Covina, Calif. LB **$414,500.** (8 bidders) Griffith Ave. SCHOOL, PUENTE, CALIF. Hudson School Dist., 15839 E. Rowland Ave., Puente, Calif. Bids Nov. 13. CD 10/25.

Guth & Schmidt, 2821 "S" St., Sacramento, Calif. CA, **$515,366.** Pacific Intermediate SCHOOL, SACRAMENTO, CALIF. Pacific Elementary School Dist., 6201 41 St., Sacramento, Calif. Awarded Nov. 20. CD 11/14, under LB.

H. H. Johnson, Inc., 856 "G" St., Chula Vista, Calif. CA **$768,210.** 87 frame, stucco DWELLINGS, Clairemont Villas, SAN DIEGO, CALIF. Johnson Tyson & Lynds, 856 G St., Chula Vista, Calif. Bids Nov. 9, awarded Nov. 20.

▲ **International Business Machine Co.,** 99 Notre Dame St., San Jose, Calif., rejected bids Nov. 13, rein.-con., structural steel I.B.M. PLANT, Phase No. 2, SAN JOSE, CALIF. Est. **$8,750,000.** CD 11/7.

Floyd Locke Constr. Co., 3043 Casitas Ave., Los Angeles 36, Calif. LB **$527,861.** (5 bidders) Twentynine Palms HIGH SCHOOL addns. TWENTYNINE PALMS, CALIF. Victor Valley Unified School Dist., Victorville, Calif. Bids Nov. 20. CD 11/8.

▲ **Phil Roulac Builder,** 1066 Kewen Dr., Marino, Calif. CA, **$1,000,000.** stucco SHOPPING CENTER, 3772 Foothill Blvd., San Fernando, VAN NUYS, CALIF. Lionel H. Uhlmann, Jr., 3450 Wilshire Blvd., Los Angeles 5, Calif. Daniel, Mann, Johnson & Mendenhall, 3325 Wilshire Blvd., Los Angeles, Calif., archts. Bids Nov. 15, awarded Nov. 20.

▲ **Royal Builders,** 5650 W. 3 St., Los Angeles, Calif. Owner Builds. **$2,264,000.** 165 frame, stucco DWELLINGS, Roscoe Blvd., Blade, Cantara, Burton and Lanmark Sts., VAN NUYS, CALIF. Awarded Nov. 18.

Kemp Brothers, 8715 Mettler St., Los Angeles, Calif. CA, **$551,200.** Sunnyside SCHOOL, South Whittier, WHITTIER, CALIF. South Whittier School Dist., 13243 E. Los Nietes Rd., Whittier, Calif. Bids Nov. 8, awarded Nov. 14. CD 11/19, under LB.

R. A. Watt Constr. Co., 7862 Western Ave., Los Angeles, Calif. CA **$421,800.** 37 stucco DWELLINGS, S. Parise Dr., E. McGee and E. Hawes Sts., WHITTIER, CALIF. Whittier Land Co., 7862 Western Ave., Los Angeles, Calif. Bids Nov. 2, awarded Nov. 18.

CANADA

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS
STREETS AND ROADS

December 12 Ontario

Ont., **Oakville**—BA 1/3—Oakville Public Utilities Comn., 52 Randall St., Contr. D, general bldg. and Contr. F, plumbing and heating for 12 m.g. water treatment plant. $850,000. Plans deposit $50 for D, $10 for F. Philips & Roberts, 113 Darling St., Brantford, engrs. CD 7/5.

BUILDINGS—BA

Ont., **Burwash**—DORMITORY—BA 12/12—Ontario Dpt. P. Wks., Parliament Bldgs., Toronto, industrial farm project, admin. wing, dormitory, kitchen and dining hall wings, power house bldg. and connecting passages Camp Bison No. 5, Burwash Industrial Farm. $500,000. J. B. Sutton, 81 Lorne St., Sudbury, archt. CD 7/17.

Ont., **Toronto**—CLUBHOUSE—BA About 12/15—Toronto Skating Club & Toronto Cricket Club, c/o 568 Dupont St., clubhouse, incl. skating rink, curling rink, $500,000. Mathers & Haldenby, 15 St. Mary St., archts. CD 5/4.

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COMPANY__________
ADDRESS__________
CITY_____ ZONE_____ STATE_____

▲ **Alta., Edmonton**—AGRICULTURE—BA 12/17—Alberta Dpt. P. Wks., Parliament Bldgs., agriculture bldg. addn., University of Alberta. $1,750,000.

Que., Notre Dame De La Salette—MILL—Bids Asked—Eastern Asbestos Co. Ltd., 132 St. James St. W., Montreal, 60x130 ft. concrete block walls, mill bldg. and admin. bldg., concrete fdn. and winterizing staff house at mill, 3 mi. north of here. $500,000. Walter A. Rukeyser, 132 St. James St. W., Montreal, engr. CD 8/29.

BUILDINGS—SLC

▲ **Que., Montreal**—OFFICE—Monat Corp., c/o Greenspoon, Freedlander & Dunne, archts., 4151 Sherbrooke St. W., soon lets contract, 17 story, 4 bsmnt. levels, rein.-con. frame office bldg. Guy and Dorchester Sts., Over $3,500,000. Pierre M. d'Allemagne, 3180 Van Horne Ave., engr.

HEAVY CONSTRUCTION—LB & CA

▲ **Bradson Cartage & Crane Ltd.**, 12560 97 St., Edmonton, Alta., CA **$1,621,820**, supplying material, digging, laying, backfilling 22,000 ft. monolithic concrete or precast 5 to 35 ft. depth 84- to 120-in. diam. storm sewers, EDMONTON, ALTA. City, City Hall, Edmonton, Alta. Bids Oct. 6, awarded Nov. 15 CD 10/23, under LB.

Forbes & Sloat Ltd., 654 Union St., Fredericton, N. B., LB **$555,786**. ground imprvs. Camp Gagetown, Army Camp, FREDERICTON, N. B. Defence Constr. (1951) Ltd., 56 Lyon St., Ottawa, Ont.

ONTARIO—Dpt. Hys., Parliament Bldgs., Toronto,
North Shore Constr. Co. Ltd., Canada Cement Bldg., Montreal, Que., CA **$574,937** (8 bidders) Contract 56-179, grading, culverts 6.54 mi. Hy. 401, Maitland. Bids Nov. 21, awarded Nov. 23. CD 11/28, under LB.

ONTARIO—Dpt. Hys., Parliament Bldgs., Toronto,
Peel Constr. Co. Ltd., Brampton, Ont., CA **$557,520** (8 bidders) Contr. 56-178, grading, culverts, granular base, hot mix paving 7.9 mi. Hy. 17, Wanapitei. Bids Nov. 14, awarded Nov. 15. CD 11/20, under LB.

S. McNally & Sons Ltd., 2200 King St. E., Hamilton, Ont. LB **$939,000** (5 bidders) 5,832 ft. 4 ft.x5ft. concrete sewer largely in tunnel, Hillhurst Blvd. from Cortleigh Blvd. to Barthurst St., TORONTO, ONT. Municipality of Metropolitan Toronto, 67 Adelaide St. E., Toronto, Ont. Bids Nov. 19. CD 11/5.

▲ **Pigott Constr. Co. Ltd.**, 1250 Bay St., Toronto, Ont., LB **$5,904,000** (5 bidders) sedimentation and aeration tanks, Humber River Sewage Treatment Plant, TORONTO, ONT. Municipality of Metropolitan Toronto, 67 Adelaide St. E., Toronto, Ont. D. E. Kertland, 36 Summerhill Gardens, Toronto, Ont., archt. James F. MacLaren Assocs., 321 Bloor St. E., Toronto, Ont. CD 1/5/55.

Schwenger Constr. Ltd., 1255 Beach Rd., Hamilton, Ont., LB **$916,000** (4 bidders) 4,529 ft. storm trunk sewers in tunnel 7 ft. and 7 ft. 6-in. diam. in Beechmount St., TORONTO, ONT. Municipality of Metropolitan Toronto, 67 Adelaide St., E., Toronto, Ont. Bids Nov. 19. CD 11/5.

▲ **Russell Constr. Ltd.**, Harbor Commissioners Bldg. Fleet St. West, Toronto, Ont., CA, **$7,280,575**, dredging in Welland Ship Canal from Guard Gate to Station 710 plus 00, Welland, QUEBEC and ONTARIO. St. Lawrence Seaway Auth., No. 2 Temporary Bldg., Ottawa, Ont. Bids Nov. 6, awarded Nov. 14. CD 11/12, under LB.

▲ **QUEBEC**—Provincial P. Wks. Dpt., Parliament Bldgs., Quebec City,
Cremazie Construction Ltee., 190 Cremazie Blvd. E., Montreal, Que., CA, Est. approx. **$2,000,000.** bridge over St. Francois River on Trans-Canada Hy. Route and Blvd. Bernard at Drummondville. O. Graham, 190 Cremazie Blvd. E., Montreal, engr. Awarded Nov. 15. CD 8/14.

Hamilton Bridge Div. of Bridge & Tank Co. Ltd., 231 Bay St., Hamilton, Ont., CA **$773,660**, supplying, installing lock valves for all locks and taintor regulating valves, Upper Beauharnois Lock, St. Lawrence Seaway, QUEBEC. St. Lawrence Seaway Auth., No. 2 Temporary Bldg., Ottawa, Ont. Awarded Nov. 20. CD 10/18, under LB.

▲ **Pentagon Constr. Co. Ltd.**, 5005 Namur St., Montreal, Que., LB **$1,539,650** (12 bidders) marine towers and receiving facilities, outside Grain Elevator No. 1, MONTREAL, QUE. National Harbors Bd., West Block, Parliament Bldgs., Ottawa, Ont. C. D. Howe Ltd., 1421 Atwater Ave., Montreal, Que. engrs.

BUILDINGS—LB & CA

▲ **Bennett & White (Alberta) Ltd.**, 11239 83 St., Edmonton, Alta., CA Est. **$2,366,000**. 10 story structural steel office bldg., Japer Ave. and 112 St., EDMONTON, ALTA. Gibraltar Leaseholds Ltd., c/o Bell & McCulloch, archts., 9946 106 St., Edmonton, Alta. Awarded Nov. 22.

W. C. Wells Constr. Co. Ltd., 10519 115 St., Edmonton, Alta., LB **$806,400** (3 bidders) 100-cell DETENSION BARRACKS, Army Barracks, EDMONTON, ALTA. Defence Constr. (1951) Ltd., 56 Lyon St., Ottawa, Ont.

▲ **Eastern Woodworkers Ltd.**, Brother St., New Glasgow, N. S., CA **$1,423,112**. 133 Class I, D.N.D. HOUSING UNITS with related services, married men's quarters, Canadian Army Camp, FREDERICTON, N. B. Defence Constr. (1951) Ltd., 56 Lyon St., Ottawa, Ont. Bids Sept. 18, awarded Nov. 22. CD 9/4.

▲ **Frankel Steel Constr. Ltd.**, East Don Roadway, Toronto, Ont., CA **$1,439,700**. structural steel for 14 story STRUCTURE housing sub-post office, income tax dpt., National Film Bd., Veterans Affairs, etc., Adelaide St. E. and Victoria St., TORONTO, ONT. Dpt. P. Wks., Hunter Bldg., Ottawa, Ont. Bids Oct. 3, awarded Nov. 22. CD 10/9, under LB.

Newton Constr. Co. Ltd., 508 Victoria St., Sherbrooke, Que., CA Est. **$520,000**. Class I, masonry SCHOOL, Camp Gagetown, Army Camp, FREDERICTON, N. B. Defence Constr. (1951) Ltd., 56 Lyon St., Ottawa, Ont. Bids Oct. 23, awarded Nov. 15. CD 10/10.

▲ **Principal Investments Ltd.**, 133 Richmond St. W., Toronto, Ont., Owner Builds, **$5,000,000**, SHOPPING PLAZA, 75-acre site, Dundas St., on Hy. 2 and Clark side road, LONDON, ONT. CD 12/14/55.

▲ **Thomas Fuller Constr. Co. Ltd.**, 199 Richmond Rd., Ottawa, Ont., LB **$2,398,549** (3 bidders) ADMINISTRATION BLDG., Booth St., for Dpt. Mines & Technical Surveys, OTTAWA, ONT. Dpt. P. Wks., Hunter Bldg., Ottawa, Ont. Bids Nov. 22. CD 11/5.

Milne & Nicholls Ltd., 57 Bloor St. W., Toronto, Ont. CA Est. **$500,000**. 3 story, 141x174 ft., rein.-con., brick Trade School, Ryerson Institute of Technology, 50 Gould St., TORONTO, ONT. Province of Ontario Dpt. Educ., Parliament Bldgs., Toronto, Ont. Bids Oct. 17, awarded Nov. 16. CD 9/25.

New Style Construction Ltd., 136 Kingston Rd., Toronto, Ont., Owner Builds, **$456,000**. 10 story 57-suite APARTMENT, 583-585 Avenue Road, TORONTO, ONT., CD 9/5.

Economy Construction Co. Ltd., 985 College St., Toronto, Ont., Owner Builds, **$800,000**. APARTMENTS, 266 Russell Hill Rd., TORONTO, ONT. CD 11/19/54.

▲ **Jarbell Investments**, 17 Farleigh Cres., Toronto, Ont., Owner Builds, **$2,096,000**. 11 story, U-shaped, 17,200 sq. ft. APARTMENT, TORONTO, ONT. CD 5/3.

▲ **Allan Weber**, 229 Yonge St., Toronto, Ont., Owner Builds, **$1,120,000**. 9 story APARTMENT and underground parking, TORONTO, ONT. CD 6/8.

Alphonse Devost, 490 rue Notre Dame, Cap de la Madeleine, Que., CA **$495,000**. SCHOOL, north of Hawey Blvd., GIFFARD QUE. La Commission Scolaire de Giffard, Giffard, Que. F. Henri Talbot, 50 Vieux-Moulin, Giffard, archt. Awarded Nov. 16.

▲ **Louis Donolo, Inc.**, 8320 St. Lawrence Blvd., Montreal, Que., CA Est. About **$3,000,000**. 300 luxury suites APARTMENT, area bounded by St. Catherine St. W., Clarke, Western and Redfern Aves., MONTREAL, QUE. Owner, c/o Ian Martin, archt., 1200 St. Alexander St., Montreal, Que. Irving S. Backler, 5253 Decarie Blvd., Montreal, Que., engr. Awarded Nov. 19. CD 2/24.

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PUERTO RICO

HEAVY CONSTRUCTION—LB & CA

▲† **Capitol Constr. Co.**, Box 9683, Santurce, Puerto Rico, LB **$4,189,467**. runway extens., tax way constr., and shoulder stabilization, Ramey Air Force Base, ENG-08-123-57-17, AGUADILLA, PUERTO RICO. U. S. Eng., Box 4970, Jacksonville, Fla. Bids Nov. 16. CD 11/13.

LATIN AMERICA

BUILDINGS—LB & CA

▲ **Feldman Building Corp.**, 605 Lincoln Rd., Miami Beach, Fla., U. S. A. CA **$5,500,000**. 17 story, 200x500 ft. HOTEL "Havana Riviera", HAVANA, CUBA. Cuban Riviera Hotel Corp., Havana, Cuba CD 11/9.

PROPOSED PROJECTS

WATER SUPPLY

▲ **Mass., Boston** — State, Metropolitan Dist. Comn., Constr. Div., 20 Somerset St., Boston, water tunnel 13 mi., Marlboro-Clinton, **$1,000,000**. To go ahead in 1957. CD 3/3/42.

▲ **Tex., Bonham**—City, Grady Fisher, mgr., City Hall, concrete earthen dam for water supply **$1,000,000**; water supply well **$50,000**; creating a lake incl. earthwork, clearing, grubbing for holding waters for domestic supply, **$250,000**.

▲ **Wash., Seattle**—City, County City Bldg., Zone 4, water supply dam, 190 ft. high on south fork of Tolt River, **$6,000,000**. Carey & Kramer, 1917 1 Ave., consult. engrs. W. E. Parker, city engr. Bids in spring. CD 9/23/55.

SEWERS, WASTE DISPOSAL

▲ **Ariz., Phoenix**—City, First Ave. and Washington St., expansion of sanitary sewer and storm sewerage sys., disposal plant and trunk lines, **$15,368,000**. Yost & Gardner, May Heard Bldg., consult. engrs. CD 6/10/53.

▲ **Utah, Layton**—North Davis County Sewer Dist., Ray J. Dawson, pres., Layton, sewage treatment plant in Syracuse. **$1,000,000**. Templeton & Linke, 500 Dooly Bldg., Salt Lake City, consult. engrs.

STREETS AND ROADS

▲ **Ill., Chicago**—Cook Co., County Bldg., Chicago, 2-right-angle turns of Outer Dr. at Michigan Ave. bridge with viaduct from bridge to Jackson Blvd., incl. widening traffic lanes on Outer Dr. bridge **$30,000,000**; 4-mi. grid system of expressways beginning at Willow Rd. west of Winnetka and extending S. to 130 St., also expressway on Western Ave., First Ave. and Southwest Hy., Chicago and near Chicago, **$500,000,000**.

▲ **Mont., Billings**—City, to form Special Improvement Dist., Billings, pave residential distr. streets throughout city, **$5,259,000**; improve arterial streets in city, **$1,718,000**; improve existing streets which now have suitable base by use of overlay mostly in business district, **$1,130,000**. Morrison & Maierle, Inc., Helena, consult engr. Sam B. Ward, city engr. CD 11/15.

▲ **N. J., Toms River**—Ocean Co. County Courthouse, constr. or imprv. 111.7 mi. county roads, i.e. Rt. 539, **$140,000**; Cedar Bridge Ave., Pt. Pleasant **$75,000**; Burnt Tavern Rd., **$160,000**; Rt. 539, **$30,000**; Long Beach Blvd; Surf City, **$560,000**; Rt. 529, **$210,000**; Lacey Rd., Forked River, **$170,000**; Rt. 526 (county line road), **$420,000**; Parkerstown Road, **$28,000**; West Creek Road, **$28,000**; Rt. 526, Lakewood, **$200,000**; Old Freehold Road, Toms River to Lakewood, **$130,000**; Rt. 534, Barnegat, **$84,000**; Long Beach Boulevard Ship Bottom to Beach Haven Inlet, **$560,000**; Rt. 532, Waretown, **$116,000**; Fischer Blvd. ext., **$70,000**; Rt 530, Toms River to Whiting, **$140,000**, all roads to be widened from 30 to 44 ft. Lawrence Wagner, James Logan, Courthouse, Toms River, consult. engrs. CD 7/23.

AIRPORTS

Conn., Windsor Locks—AIRPORT—State P. Wks. Dpt., 165 Capitol Ave., Hartford, plans by Phelps Barnum, 250 Park Ave., New York, N. Y., 2 story, 57x85 ft. Bradley Field Terminal Bldg. addn. **$550,000**. Bids after Jan. 1. CD 5/21.

N. J., Trenton—AIRPORT—Dpt. Army, 2635 Abbottsford Rd., Phila., Pa., plans by Kramer Hirsch & Carchidi, archts.-engrs., 115 W. State St., Mercer Airport, Air Reserve Training Center, **$500,000**. Bids soon.

▲† **Tenn., Union City**—AIRCRAFT WARNING SYS.—U. S. Eng., 303 Federal Office Bldg., Nashville, constr. aircraft warning sys., incl. 13-15 semi-permanent structures. **$1,000,000**.

▲ **Tex., Dallas**—HANGAR—Southwest Airmotive Co., Love Field, five-year program, incl. five section 160x800 ft. hangar and business aircraft terminal, 80x400 ft. Plane-O-Tel storage hangar, 2 story office, other hangars and ramps, **$4,000,000**. Goodwin & Cavitt, 4801 Lemmon St., consult. engrs.

PUBLIC BUILDINGS

▲ **Ala., Talladega**—SCHOOL—City, City Hall, constr. and addn. to city schools. **$1,000,000**.

▲ **Calif., Anaheim**—SCHOOLS—Anaheim Unified High School Dist., Anaheim, voted **$6,000,000** bonds Oct. 23, 2 high schools and 4 Junior High Schools. CD 8/20.

▲ **Calif., Fresno**—SHOPS—Fresno City Unified School Dist., c/o Supt. 2348 Mariposa St., plans by Walter Wagner & Partners, 1830 Van Ness St., shops, repairs and alterations at Fresno Junior College, **$1,925,000**; plans by Robert W. Stevens, 944 N. Van Ness St., elementary school, **$480,000**. CD 11/9.

▲† **Calif., Lathrop**—RADIATION CENTER—Atomic Energy Comn., 1901 Constitution Ave. N.W., Wash. 25, D. C. army ionizing radiation center, nuclear reactor for experiments in food preservation Sharpe General Depot. **$3,000,000**. Internuclear Co., Clayton, Mo., consult. engr.

▲† **Calif., Lathrop**—RADIATION CENTER—U. S. Eng., 1209 8 St., Sacramento, Army Ionizing Radiation Center, incl. high energy particle accelerator, offices, laboratories, storage and processing areas, Sharpe General Depot. **$4,500,000**.

▲ **Calif., Los Angeles**—STEAM PLANT, etc.—Los Angeles Water & Power Dpt., 311 S. Spring St., Los Angeles, five-year program;

Hayes Steam Plant near Alamitos Bay, **$85,600,000**;
Receiving Station "L" near Scattergood Plant, **$2,575,600**;
warehouses and office, Fairfax District Headquarters, 2611 S. Fairfax Ave., **$116,123**.
Granada Trunk Line III, West San Fernando Valley. **$1,602,300**;
heavy mechanical repair shops at general headquarters, 1630 N. Main St., **$829,675**;
Distributing Center No. 7, Civic Center, **$349,971**;
Distributing Center No. 64, 14860 Ventura Blvd., Sherman Oaks, **$143,600**;
Distributing Station No. 65, 5555 Sylvia Ave., Tarzna, **$433,900**;
Distribution Station No. 66, 12200 San Vicente Blvd., Brentwood, **$521,900**;
facilities for Overhead Line Headquarters No. 9, 7218 Deering Ave., Canoga Park, **$74,138**;
Overhead Line Headquarters No. 5, 6000 Van Nuys Blvd., Van Nuys, **$130,000**;
facilities for Overhead Line Headquarters No. 2, 611 N. Hanover St., **$143,000**.

▲ **Calif., Los Angeles**—PROCESSING CENTER— Regents of University of Calif., Administration Bldg., Western Data Processing Center. **$2,000,000**.

▲ **Calif., Oakland**—HALL—City, City Hall, plans by Frederick L. R. Confer, 366 40th St., new Hall of Justice Bldg. **$2,707,000**. CD 12/14/55.

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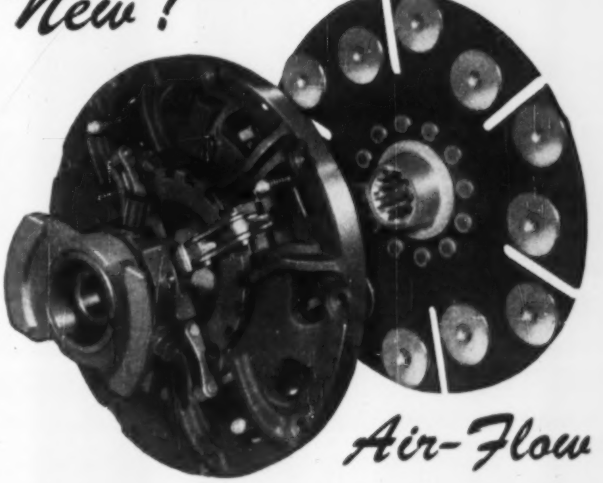

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CLUTCHES

▲ **Calif., Palo Alto**—SCHOOL—Palo Alto Unified School Dist., c/o Secy., 543 Channing Ave., plans by Clark & Stromquist, 321 Channing Ave., frame, stucco Junior High School. **$1,200,000.** CD 5/23.

▲ **Calif., Redding**—SCHOOLS—Shasta Union High & College School Dist., Redding, voted **$3,000,000** bonds Nov. 6, schools. Charles F. Dean, 1521 "I" St., Sacramento, archt. CD 11/9.

▲ **Calif., San Leandro**—LIBRARY—City, City Hall, plans by Francis J. McCarthy, 693 Mission St., San Francisco, 44,000 sq. ft. public library, meeting rooms and auditorium. **$1,000,000.**

▲ **Calif., Santa Ana**—COURTHOUSE—Bd. Supervs. Orange Co., Courthouse, defeated **$8,000,000** bonds Nov. 6, courthouse, incl. 12 courts and county jail. CD 9/13.

▲ **Calif., Stockton**—SCHOOL—Lincoln Unified School Dist., c/o Supt., 818 Lincoln Rd., plans by Dana D. Carrough, 205 Lincoln Center, 1 story, frame, stucco Lincoln High School. **$1,000,000.** CD 12/1/55.

▲ **Conn., Clinton**—SCHOOL—Town, Town Hall, high school, west end of town, **$1,000,000.**

Conn., Ellington—SCHOOL—Town, Public Schools, Middle Butcher Rd., Rockville, 600 pupils high school. **$700,000.**

Conn., Norwalk—HOUSING—Norwalk Housing Auth., Washington Village, South Norwalk, plans by Gerald M. Gilroy, 64 Wall St., South Norwalk, 6 and 7 story moderate rental housing, 2 multistory houses. **$907,500.** CD 4/4.

▲ **Idaho, Kellogg**—HOSPITAL—West Shoshone Hospital Dist., 1 and 2 story rein.-con. hospital. **$1,095,000.** Skidmore Owings & Merrill, 2040 S.W. Jefferson St., Portland, Ore., archts. CD 12/7/55.

▲ **Kan., Hutchinson**—SCHOOL—Bd. Educ., voted **$3,800,000** bonds Nov. 6, schools, addns. CD 7/6.

Mass., East Longmeadow—SCHOOL—Town, Robert Jarvis, supt. Schools, East Longmeadow, plans by S. W. Haynes & Assoc., 336 Main St., Fitchburg, high school. **$800,000.** Constr. 1957.

▲ **Mass., Mattapan**—BUILDING—Commonwealth of Mass., Dpt. Constr., c/o Div. Bldg. Constr. 38 Chauncy St., Boston, plans by M. A. Dyer, Co., 24 School St., Boston, classification bldg., P-804. **$1,100,000.** Constr. 1957.

▲ **Mich., Midland**—SCHOOL—City, Bd. Educ., Midland Public Schools, plans by Jahr-Anderson Assoc, Inc., 15011 Mich. Ave., Dearborn, Junior High School and elementary school. **$1,200,000.** CD 8/23.

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Mich., Traverse City—HOSPITAL—Bd. Supervs. Grand Traverse Co., Traverse City, voted **$500,000** bonds. Nov. 6, county hospital. CD 7/16.

Minn., Hopkins—SCHOOLS—Bd. Educ., School Dist. No. 225, L. H. Tanglen, supt. Schools, plans by Bissell & Belair, 1111 Nicollet Ave., Minneapolis, Westview Elementary School addn., and Katherine Curren Elementary School addn., **$700,000.** CD 12/12/50.

▲ **Neb., Chadron**—SCHOOLS—State Normal Bd., Lincoln, demonstration school bldg., **$800,000;** field house-gymnasium, **$344,000;** practical arts bldg., **$520,000.** Chadron State Teachers College.

▲ **Neb., Lincoln**—PHYSICS BUILDING, etc.—University of Nebraska, 12 and R. Sts., physics bldg., **$1,500,000;** music bldg., **$1,000,000;** womens educational bldg., **$900,000;** power plant addn., **$1,200,000.**

Nev., Fallon—SCHOOL—Churchill Co. School Dist., Fallon, voted bonds Nov. 6, for 16 classrooms and multi-purpose room at West End School and Agricultural Dpt. and music room addn. at high school. **$500,000.** Igaz, Alegre & Harrison, 1030 Lander St., Reno, archts.

▲ **N. H., Laconia**—SCHOOL—City, Whitman Ide, Chn. Bldg. Comm., Walker St., plans by Alonzo J. Harriman, Inc., 292 Court St., Auburn, Me., Senior High School, **$1,000,000.** Prescott & Erickson, 653 Main St., consult. archts. CD 6/6.

▲ **N. J., Bernardsville**—SCHOOL—Bd. Educ., Borough of Bernardsville, plans by Sherwood, Mills & Smith, 65 Broad St., Stamford, Conn., grade school on site of old Polo Grounds. **$1,500,000.** CD 11/9.

N. J., Dunellen—SCHOOL—Bd. Educ., defeated **$900,000.** bonds Nov. 1, high school, Alfonzo Alvarez, Upper Montclair, archt. CD 10/16.

▲ **N. J., Irvington**—SCHOOLS—Bd. Educ., Town of Irvington, plans by Percy M. Ivory, 1087 Springfield Ave., 1 story Madison Ave. school addn., **$750,000;** 600-seat auditorium and gymnasium, Grove Street School addn., **$850,000;** 2 story wing on Augusta Street and 1 story wing on Ball St., Augusta Street School addn. **$500,000.**

N. Y., Syosset—SCHOOL—Central School Dist. No. 2, Syosset, plans by Eggers & Higgins, 100 E. 42 St., New York, elementary school west side of Robbins Lane. **$850,000.** CD 11/12.

O., Austintown—SCHOOLS—Austintown School Bd. Educ., Austintown, plans by Kling & Frost, 661 Wick Ave., Youngstown, schools. **$803,000.** CD 11/12.

▲ **O., Chagrin Falls**—SCHOOLS—Bd. Educ., Orange Local School Dist., 3200 Chagrin Blvd., plans by Outcalt, Guenther & Assocs., 13124 Shaker Square, Cleveland Zone 20, school building program. **$1,250,000.** CD 11/9.

▲ **O., Columbus**—DORMITORIES—Ohio Dpt. P. Works, State Dpts. Bldg., Columbus, 600-unit married students dormitory, north of present GI Village, **$6,600,000;** three mens dormitories, south of Baker Hall, **$8,133,500;** men's dormitory, W. Woodruff Ave., **$22,000,000;** 600 unit men's dormitory, Lane Ave. and Olentangy River Rd., **$6,600,000.** CD 9/21/54; women's dormitory, W. 11 Ave., **$1,500,000.** CD 11/27/53, all foregoing at Ohio State University.

▲ **O., Elyria**—COUNTY BLDG.—Comrs. Lorain Co., Court House, defeated **$3,000,000** bonds Nov. 6, county bldg. (**Correction**—bond election status). CD 11/9.

▲ **O., Fairborn**—SCHOOLS—Bd. Educ., Fairborn, voted **$1,000,000** bonds Nov. 6, high school addn., Five Points Grade School addn. CD 8/23.

▲ **O., Flushing**—HIGH SCHOOL—Bd. Educ., Union Dist., Flushing, voted bonds Nov. 6, high school; repairs and imprvs. at Belmont, Bethesda, Holloway, Centerville and Morristown Schools. **$1,115,000.** CD 7/10.

O., Huron—HIGH SCHOOL—Huron Public Schools, R. L. McCormick, Executive Head, Huron, plans by Buehrer & Stough, 1029 Sylvania Ave., Toledo, high school. **$989,000.** Bids in March and April of 1957. CD 11/12.

O., Hudson—SCHOOL—Hudson Public Schools, Hudson, plans by Outcalt, Guenther & Assocs., 13124 Shaker Square, Cleveland Zone 20, elementary school. **$500,000.** CD 11/12.

▲ **O., Ironton**—SCHOOLS—Bd. Educ., Ironton, plans by Donaldson & Co., National Bank Bldg., Portsmouth, schools. **$2,200,000.** CD 11/9.

O., Logan—SCHOOL—Bd. Educ., Logan, plans by McLaughlin & Keil, 500 Dominion Bldg., Lima, school imprvs. **$900,000.** Bids about Apr. 1, 1957. CD 11/9.

▲ **O., Louisville** — SCHOOLS — Bd. Educ., Louisville, plans by Lawrence Dykes & Assocs., 125 Valleyview N.W., Canton, schools. **$1,150,000.** Bids about Mar. 1, 1957. CD 11/12.

O., Marion—SCHOOL—Bd. Educ., Ridgedale School Dist., Route 4, plans by Strong, Strong & Strong, 124 S. West St., Lima, high school. **$695,000.** CD 11/12.

▲ **O., Parma**—SCHOOLS—The Parma Public Schools, Carl C. Byers, supt. Schools, 5401 W. 54 St., Parma (Cleveland 29), plans by Fulton, Krinsky & DelaMotte, 6014 Euclid Ave., Cleveland, Zone 3, schools. **$3,200,000.** CD 11/9.

▲ **O., Sidney**—HIGH SCHOOL—Bd. Educ., Sidney, plans by Outcalt & Guenther & Assocs., 13124 Shaker Square, Cleveland, O., high school, **$2,565,000.** Freytag & Freytag, Sidney, O., consult. engrs. CD 11/9.

▲ **O., Toledo**—SCHOOL—Bd. Educ., 121 Southard St., 1 story, brick Elmhurst school, 1 story, brick Miracle Mile Manor (Larchmont) School, **$1,200,000.** CD 11/23/49.

O., Toledo—SCHOOL—Toledo Bd. Educ., 121 Southard St., plans by Hahn & Hayes, 723 Adams St., Elmhurst School, **$678,000.** CD 11/20.

O., Troy—HIGH SCHOOL—Bd. Educ., Miami East School Dist., Route 1, Troy, voted bonds Nov. 6, high school. **$780,000.** CD 7/17.

▲ **Okla., Warr Acres**—SCHOOL—Putnam City Bd. Educ., Warr Acres, voted bonds Nov. 15, high school. **$1,109,000.** Hudgins, Thompson & Ball, 1411 Clarsen Blvd., Oklahoma City, archts. CD 11/7.

S. D., Sturgis—SCHOOL—Bd. Educ., voted **$750,000** bonds Oct. 23, high school. Plan to let contract in January. Lucas, Craig & Whitwam, 220 Kresge Bldg., Sioux Falls, archts. CD 11/8.

Tex., El Paso—HIGH SCHOOL—El Paso Public Schools, 100 W. Rio Grande St., P. O. Box 1710, plans by Carroll & Daeuble, 1001 E. Yandell Blvd., Summit Heights Junior High School. **$750,000.** Bids January 1957. CD 7/14/55.

▲ **Tex., Port Lavaca**—COURTHOUSE, etc.—Calhoun Co., Port Lavaca, bond election Dec. 15, 3 story masonry courthouse and jail, **$800,000;** agricultural bldg., **$200,000.** CD 10/2.

▲ **Tex., Tyler**—SCHOOLS—Tyler Independent School Dist., plans by Bruce-Russell, Tyler, and Caudill, Scott & Rowlett, Bryan, Senior High School, **$2,000,000;** Junior High School, **$1,375,000;** Elementary School No. 1, **$350,000;** Elementary School No. 2, **$400,000;** Elementary School No. 3, **$375,000.** CD 10/24/55.

▲ **Utah, American Fork**—SCHOOLS—Alpine School Dist., Frank Jex, dir., American Fork, plans by Cannon, Smith & Gustavson, 1555 East 3900 South St., Salt Lake City, high school, American Fork, **$1,500,000;** high school, Pleasant Grove, **$1,500,000.** CD 7/15/55.

Utah, Sandy—HIGH SCHOOL—Jordan School Dist., 9361 S. State St., plans by Ashton, Evans & Brazier, 24 SW Temple St., Salt Lake City, Junior High School, 1400 South Redwood Rd., West Jordan, **$500,000.**

Wash., Tacoma—SCHOOL—School Bd. S. 8 and Tacoma Sts., plans by Lea, Pearson & Richards, 240 S. Stadium Way, rebuilding Stadium High School. **$850,000.** Work next summer. CD 11/14.

Wash., Wenatchee—LIBRARY—Chelan Co. Library Bd., voted **$596,000** bonds Nov. 6, library.

Wyo., Thermopolis—HOSPITAL—Hot Springs County hospital, Thermopolis, plans by Fisher, Fisher & Davis, consult. engrs.-archts., 827 Denver National Bldg., Denver, Colo., hospital. **$719,000.**

▲ **Ont., Oshawa**—HOME—City, City Hall, home for aged. **$1,200,000.** City Council has adopted a report recommending its constr.

COMMERCIAL BUILDINGS

Ala., Vestavia Hills—CHURCH—Vestavia Hills Methodist Church, 712 Eastwood Pl., plans by Greer, Holmquist, & Chambers, Stallings Bldg., Birmingham, church plant to be built in 3 units. **$750,000.**

Colo., Denver—OFFICE—Professional & Business Men's Life Insurance Co., Tabor Bldg., plans by Fisher, Fisher & Davis, archts.-engrs., 827 Denver National Bldg., first unit, 10 story and bsmnt., 26,000 sq. ft. office bldg. **$850,000.**

▲ **Colo., Denver**—MOTEL—Writer Brothers, 1730 South Colorado Blvd., plans by Huntington & Brelsford, archts.-engrs., 370 West 7th St., motel, Smith Rd. and Kearny St. **$1,200,000.**

▲ **Conn., Hartford**—DORMITORY—Hartford Hospital, 80 Seymour St., nurses dormitories for students at School of Nursing, **$450,000;** Jefferson House for Elderly Patients to house 150, Retreat Ave. **$900,000.** CD 8/9/45.

▲ **Conn., New Haven**—DORMITORY—Yale University, 105 Wall St., New Haven, plans by Douglass Orr, 111 Whitney Ave., dormitory for women students, Temple St. **$1,000,000.** Hubbard, Lawless & Blakeley, 110 Whitney Ave. and Henry A. Pfisterer, 111 Whitney Ave. consult. engrs. CD 10/31.

▲ **D. C., Wash.**—SHOPPING CENTER—Joseph H. Kinski, 1101 Vermont Ave. N. W., plans by George E. Stone, Wire Bldg., shopping center, Alabama Ave., Naylor and Good Hope Rds. S. E. **$2,000,000.**

▲ **Ind., Chesterton**—SHOPPING CENTER—Vic Nash Enterprises, Inc., c/o Gene Beak, 100 W. Monroe St., Chicago, Ill., plans by Louis H. Huebner, 666 N. Lake Shore Drive, Chicago, Ill. Dunes Valley Shopping Center, 16 acres, Wabash Ave., 8th St. and Waverly Rd. **$2,000,000.**

▲ **Kan., Hutchinson**—HOUSING—Ninth Naval Dist., Bldg. 1-A, Great Lakes, Ill., plans by F. L. McAleavey, 254 Laura St., Wichita, construct and finance housing (Capehart), Naval Air Station. **$5,000,000,** Ediger Eng. Co., 252 Laura St., Wichita, consult. engr.

▲ **Ky., Louisville**—AUDITORIUM, etc.—Bellarmine College, 2000 Norris Pl., plans by Thos. J. Nolan & Sons, Kentucky Home Life Bldg., Zone 1, auditorium, gymnasium, men's dormitory, faculty house, Newburg Rd. **$3,000,000.**

▲ **Me., Springvale**—BUILDING—Nasson College, Harry A. Mapes, chn. Fund Drive, Sanford, bldgs. **$1,500,000.**

▲ **Mass., Brookline**—HOSPITAL—Allerton Hospital, 68 Allerton St., plans by William Nelson Jacobs Assocs., Inc., 316 Stuart St., Boston, hospital, High and Chestnut Sts. **$1,000,000.** CD 3/11/55.

Mass., Worcester—DORMITORY—Assumption College, 670 West Boylston St., dormitory. **$620,000.** Constr. 1957.

▲ **Mich., Cutlerville**—RETREAT SCHOOL, etc.—Pine Rest Christian Assn. Bd. Trustees, C. A. Van Hattem, pres., Cutlerville, plans by J. & G. Daverman Co., 924 Grandville St. S. W., Grand Rapids, expansion,

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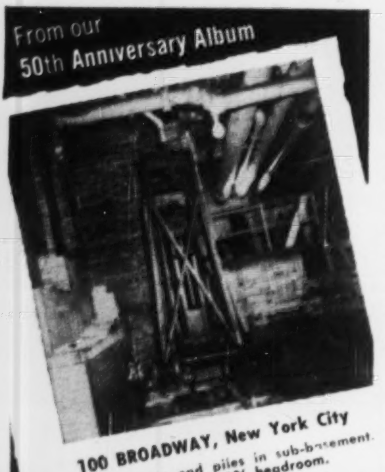

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Mich., **Detroit**—OFFICE—Aluminum Co. of America, Alcoa Bldg., Pittsburgh, Pa., plans by Harrison & Abramovitz, 630 Fifth Ave., New York, 2 story, 40,000 sq. ft. aluminum sheathed district office, W. Grand Blvd. and Third St. **$600,000-$1,000,000.**

▲ **Mo., Fulton**—DORMITORY—William Woods College for Women, Dr. Tilford Swearingen, pres., 3 dormitory bldgs. for girls school. **$1,000,000.**

▲ **Mo., St. Joseph**—HOSPITAL—Daughters of Charity, St. Joseph, plans by Everett Johns, 517½ Francis St., Sisters' Hospital, Ninth and Powell Sts. **$4,000,000.** CD 2/25/54.

▲ **N. J., Orange**—HOSPITAL—Bd. Trustees St. Mary's Hospital, 135 Center St., Orange, and Archdiocese of Paterson, plans by Fanning & Shaw, 49 Ward St., Paterson, 2 five story wings hospital addn., S. Center St. and new nurses school, Henry St. **$5,000,000.** CD 8/8.

▲ **O., Reynoldsburg**—HOUSING, etc.—G. E. Bass & Co., 2715 N. State St., Jackson, Miss., 400 homes, golf course and shopping center. **$7,000,000.** Evans, Mechwart, Hambleton & Tilton, 152 Mill St., Gahanna, consult. engrs.

O., Rocky River—SHOPPING CENTER—Pick-N-Pay Supermarket; 3621 Chester Ave., Cleveland, Zone 14, plans by Weinberg & Teare, Citizens Bldg., Cleveland, Zone 14, 5-store shopping center, with off-street parking, **$500,000.** CD 6/5.

Pa., Abington—SUPERMARKET—Food Fair Properties, Inc., 99 Park Ave., New York, N. Y., supermarket, York St. **$500,000.**

Pa., Harrisburg—OFFICE—State Auto Insurance Assoc., 4th and Division Sts., 41,000 sq. ft. three level office bldg., 23rd and Herr Sts. **$750,000.**

Pa., Jennersville—HOSPITAL—Community Memorial Hospital, c/o Wm. B. Ewing, West Grove, plans by Herbert Spangler Miller, Peoples Bank Bldg., Fourth and Wood Sts., Pittsburgh, hospital. **$750,000.** CD 5/25/55.

▲ **S. C., Charleston Heights**—SHOPPING CENTER—Pinehaven Shopping Center, Box 2098, Charleston, plans by Herbert B. Hunter, 121 W. 4th St., Charlotte, N. C., shopping center. **$2,000,000.** CD 11/15.

▲ **S. C., Fort Jackson**—HOUSING—U. S. Eng., Charleston, plans by Reid Hearn & Assocs., consult.-engrs.-archts., 600 Beltline Blvd., Columbia, construct and finance 300-unit of Capehart Housing. **$3,000,000.**

Tex., Corpus Christi—HOTEL IMPRVS., etc.,—Bobby Manziel, Tyler, will not construct imprvs. and expansion to existing Stonewall Jackson Hotel. **$500,000.** Project abandoned. CD 3/19.

▲ **Tex., Del Rio**—HOUSING—U. S. Govt., Laughlin Air Force Base, Del Rio, plans by Roscoe P. DeWitt, 205 Cedar Springs Rd., Dallas, construct and finance, 500-unit family housing (Capehart). **$5,750,000.** Bids in January 1957. CD 4/25.

▲ **Tex., Houston**—OFFICE, etc.—David C. Bintliff Interests, 812 Rusk St., plans by Alfred C. Finn, Bankers Mortgage Bldg., 22 story, 300,000 sq. ft. office, **$6,000,000;** earthwork, landscaping, drainage, **$48,000;** parking garage facilities, **$300,000.** Sebastian Corp., 2111 Norfolk St., consult. engrs. for air-conditioning and all mechanical work. CD 11/20.

▲ **Tex., Houston**—SHOPPING CENTER—Fairmount Park Shopping Center, c/o Wm. G. Farrington, developer, 1661 Tanglewood St., plans by Wm. G. Farrington & Co., 1661 Tanglewood St., shopping center units. **$10,000,000.** CD 10/31.

▲ **Tex., Richardson**—SHOPPING CENTER—Dr. J. P. Addison, Jack D. Dillard & Dallas Blankenship acting as Trustees for Owners, 8400 Douglas St., Dallas, shopping center, 100 acre site Coit and Spring Valley Rds. **$3,000,000.**

Tex., Tyler—Y.M.C.A.—Young Men's Christian Assn., c/o Lee Lawrence, plans by S.W. Ray, 605 Fair Bldg., Y.M.C.A. bldg., incl swimming pool. **$550,000.**

Vt., Rutland—SCHOOL—Mt. St. Joseph's Academy, 132 Convent Ave., plans by Julian W. Goodrich, 930 Shelburne Rd., South Burlington, high school addn. **$500,000.** Jennison Engineers, Inc., 15 Center St., Burlington, struc. engr. Bids end of November or early December.

▲ **Wash., Prosser**—HOSPITAL—Prosser Memorial Hospital, plans by Whitehouse, Price, De Neff & Deeble, Hutton Bldg., Spokane, 2 story hospital addn. **$1,000,000.** Bids in Spring. CD 2/8.

W. Va., Charleston—CHURCH—First Presbyterian Church plans by Greife & Daley, Payne Bldg., church activities bldg., Broad St. and Kanawha Blvd. **$500,000.**

▲ **Wis., Racine**—CLUBHOUSE—Young Men's Christian Assn., 217 4th St., plans by Grassold, Johnson & Assoc., 734 N. Jefferson St., Milwaukee 2, clubhouse. **$1,700,000.** CD 1/26.

▲ **Ont., Ottawa**—HOTEL—Lord Elgin Hotel Ltd., Elgin St., constr. Lord Elgin Hotel addn. **$2,000,000.**

INDUSTRIAL BUILDINGS

▲ **Calif., Huron**—PLANT—Ammonia Chemical Corp. of Calif., Monterey Oil Co., 900 Wilshire Blvd., Los Angeles, anhydrous ammonia plant, **$5,000,000.**

▲ **Fla., Orlando**—PLANT, etc.—Glenn L. Martin Co., Middle River Rd., Baltimore, Md., plans by Connell, Pierce, Garland & Friedman, archts.-consult. engrs., 315 N. 27th Ave., Miami, mfg. plant and office, S. Orange Blossom Trail, 12 sq. mi. tract, mfg. electronics nucleonics missiles and aircraft, **$21,100,000.** CD 9/21.

Ill., Chicago—PLANT—Johns-Manville Corp., 22 E. 40th St., New York, N. Y., plans by Schmidt, Garden & Erikson, 104 S. Michigan Ave., 64,000 sq. ft. expanded Chicago plant, 7800 S. Woodlawn St. **$650,000.**

▲ **Ill., Decatur**—PLANT—Pittsburgh Plate Glass Co., 420 Fort Duquesne Blvd., Pittsburgh 1, Pa., glass producing plant. **$4,000,000.** Sverdrup & Parcel, Inc., 915 Olive St., St. Louis 1, Mo., consult. engr. CD 10/5/55.

▲ **Ky., Carrollton**—PLANT, etc.—Metal & Thermit Corp., 100 Park Ave., New York 17, N. Y., chemical processing plant, office, warehouse and steam plant, near here. Knowles Associates, 19 Rector St., New York, N. Y., consult. engrs.

Mass., **Cambridge**—RESEARCH—Arthur D. Little, Inc., 30 Memorial Dr., technical economics and operations research bldg., Acorn Park Rte. 2, **$800,000.** CD 2/18/55.

▲ **Mass., Concord**—LABORAORY—Nuclear Metals, Inc. (subsidiary of Arthur D. Little, Inc.), 30 Memorial Dr., Cambridge, 70,000 sq. ft. laboratory, **$1,000,000.** To go ahead in 1957.

Minn., **Golden Valley (P. O. Minneapolis)**—FACTORY—Atland Mfg. Co., 1312 East 21st St., Minneapolis, plans by Ackerman & Cooperman, 1216 Nicollet Ave., Minneapolis, 50,000 sq. ft. floor space factory, Golden Valley Rd. **$500,000.** CD 7/26.

▲ **Mo., Hazelwood (St. Louis 21 P. O.)**—WAREHOUSE, etc.—Kroger Co., Robert A. Hughes, mgr., 1311 S. 39 St., St. Louis, Zone 10, plans by Elliston-Hall-McAllister & Stockwell, 706 Walnut St., Cincinnati, O., warehouse, bakery and office, 1 story dock areas for both truck and railroad cars on 63 acre tract U. S. 66 adjacent to St. Louis Municipal Airport. **$3,000,000.** CD 7/12.

▲ **Mo., St. Louis County**—PLANT—Vickers Electric Div., Vickers, Inc., 1815 Locust St., St. Louis, Zone 3, plant mfg. electric control equip. on 11 acre tract at Hoege Rd. and New Hampshire Ave., incl. parking facilities. **$2,500,000.**

▲ **N. J., Newark**—PLANT—Irvington Varnish Division Minn. Mfg. Mining, 6 Argyle Terrace, Irvington, chemical plant on 21 acre tract Wilson and Doremus Avenues Newark for processing and mfg. work now done at Irvington, **$1,500,000-$2,000,000.**

O., **Canton**—LABORATORY—Timken Roller Bearing Co., 1835 Dueber St. S. W., Zone 6, 2 story steel, brick, tile metallurgical research laboratory, Hamilton Ave. **$500,000.**

Pa., Plymouth Meeting—WAREHOUSE—L. B. Smith, Inc., 29th St. and Montgomery Ave., plans by James R. Edmunds Jr., 1025 St. Paul St., Baltimore, Md., warehouse and office bldg. **$500,000.**

▲ **Utah, Salt Lake City**—PLANT—Sperry Gyroscope, Div. of Sperry Rand, 248 North 21st West, plans by Paul K. Evans, 237 East Third South, addnl. bldgs. for new Sperry Gyrascope plant, **$1,000,000.** Bids in January.

▲ **Ont., London**—PLANT—Canada Vulcanizer & Equipment Co., Ltd., 1109 York St., plant extension, 1 story, 104x822 ft. fabricating plant bldg., engineering, storage and service quarters. **$1,000,000.** Smith, Hinchman & Grylls, Inc., 200 Canada Trust Bldg., Windsor, consult. engr.

UNCLASSIFIED

Conn., **New Haven**—SKATING RINK—Yale University, 119 College St., plans by Eiro Saarinen, Bloomfield Hills, Mich., and Douglas Orr, 111 Whitney Ave., New Haven, David S. Ingalls Skating Rink, Sachem and Mansfield Sts. **$750,000.** Severud, Elstad & Kruegar, 415 Lexington Ave., New York, N. Y., consult. engrs. and Jaros, Baum & Bolles, 415 Lexington Ave., New York, N. Y., engrs. CD 10/31.

Mich., **Pontiac**—FREIGHT YARD—Grand Trunk & Western R.R. Co., A. N. Laird, ch. engr., 131 W. Lafayette St., Detroit, freight yard, 3000 ft. long, north side, marshalling facilities to serve principally Pontiac Div. General Motors, **$700,000.**

Ohio—COMPRESSOR UNITS—Ohio Fuel Gas Co., 109 N. Front St., Columbus, two 1,500 h.p. compressor units at Crawford Station. **$850,000.** FPC gave temporary authorization.

Oklahoma—RURAL DISTRIBUTION LINES—Caddo Electric Co-operative, Binger, 238 mi. electric distr. lines and sys. imprvs. Caddo Co. **$900,000.** CD 2/8/51.

▲ **Tex., Houston**—SHIPYARD CONSTRUCTION—Bludworth Shipyard, Inc., Nueces and Brays Bayou, contr marine railway, Brady Island, **$100,000;** plant unit for shipbuilding, **$500,000;** shipyard docks, **$200,000;** misc. work in connection of establishment of shipbuilding plant in new location, **$200,000.**

▲ **Tex., Midland**—COLISEUM, etc.—Midland Ind. School Dist., Midland, plans by Percy Bridgewater, Midland, coliseum and football stadium. **$1,000,000.** CD 11/13/53.

Virginia—RURAL DISTRIBUTION LINES—Central Virginia Elec. Co-operative, Lovingston, 100 mi. electric distr. line and sys. imprvs. Nelson Co. **$530,000.**

▲ **Washington**—RURAL DISTRIBUTION LINES—Douglas County Public Utility Dist., Bridgeport, electrical distr. lines, Douglas Co. **$1,425,000.**

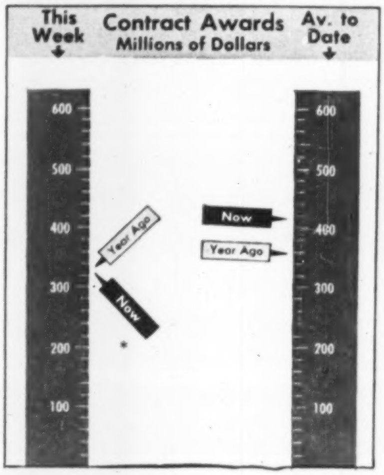
▲ **Wis., Madison**—PARKING—City, City Hall, voted **$2,500,000** bonds Nov. 6, municipal parking.

Wyoming—RURAL DISTRIBUTION LINES—Wyrylec Co., Lingle, 52 mi. electric distr. lines, 23 mi. transmission line and sys imprvs., Goshen Co. **$522.000.** CD 2/8/51.

(Proposal Advertisement see pp. 354 to 356)

Construction Scoreboard

Activity this Week



* 4-day week

AMOUNT OF CONTRACTS LET

By Ownership	This Week	Cum. 49 wks 1956	Chge %
	millions		
Federal	$36.3	$1,604.1	+2
State and Municipal	79.8	6,181.8	+24
Total Public	116.1	7,785.9	+18
Total Private	207.2	12,659.1	+14
U. S. Total	$323.3	$20,445.0	+16
By Type of Work			
Waterworks	$5.7	$341.1	+17
Sewerage	7.6	556.2	+51
Bridges	6.8	598.1	+27
Highways	26.0	2,337.6	+16
Earthwork, Waterways	11.2	688.8	+33
Buildings:			
Public, Excl. Housg.	38.4	1,977.7	+22
Public Housing	6.5	301.5	+24
Private Housing	30.4	5,085.0	−14
Commercial	73.7	1,851.8	+17
Industrial	90.3	5,028.5	+86
Unclassified	26.7	1,678.7	−13
U. S. Total	$323.3	$20,445.0	+16

NOTE: Minimum size projects included are: Waterworks and waterways, $44,000; other public works, $73,000; industrial buildings, $93,000; other buildings, $344,000.

NEW CAPITAL FOR CONSTRUCTION

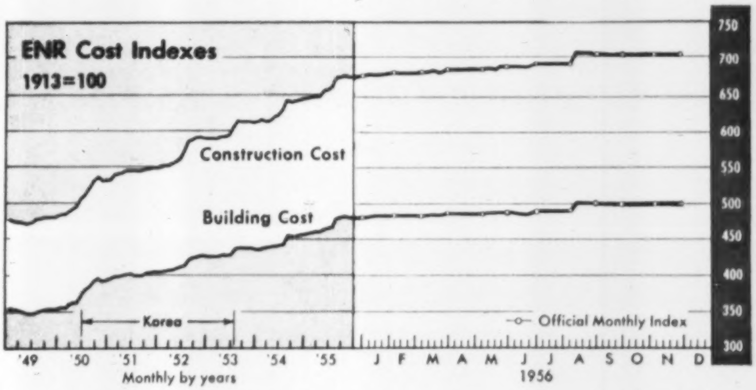
	Week of Nov. 29	Cum. 48 wks 1956	Chge '55-'56
	millions		%
Corporate Securities	$60.2	$4,429.1	+30
State and Municipal:			
All Except Housing	47.9	4,273.5	−5
Housing	...	91.1	−2
Federal Loans	...	134.0	+10
Federal Aid	...	$1,070.0	+25
Total Nonfederal	$108.1	$9,997.7	+11
Federal Appropriations:			
In U. S.	...	3,460.3	+2
Outside U. S.	...	15.9	−81
Total New Capital	$108.1	$13,473.9	+8

Cost Indexes as of Now

ENR INDEXES (1913=100), 20-cities' average	Week of Nov. 29 1956*	% Change from Nov. 8 1956	% Change from Dec. 1 1955
Construction Cost	703.82*	−0.04	+4.6
Building Cost	500.17*	−0.06	+4.5

*Official Monthly Index for December.

To convert above indexes to 1926=100: Divide Construction Cost by 2.080; Building Cost by 1.850.
1949=100: Divide Construction Cost by 4.770; Building Cost by 3.518.



WAGE RATES, 20-cities' average	Dec. 1956	% Change from Nov. 1956	% Change from Dec. 1955
Common	$2.192	0	+4.5
Skilled (average 3 trades)	3.433	0	+4.3
Bricklayers	3.709	0	+4.6
Structural Ironworkers	3.411	0	+4.1
Carpenters	3.179	0	+4.3
MATERIAL PRICES, 20-cities' average			
Structural Steel (average 3 mills), per cwt	$5.00	0	+8.7
Lumber, 2x4 Fir, per M fbm	116.736	−0.4	−1.9
Lumber, 2x4 Pine, per M fbm	102.933	−0.2	+2.2
Cement, bulk, per bbl	3.770	+0.3	+6.4
Sand, per ton	2.418	0	+1.7
Ready-mixed concrete, per cu yd	13.401†	−0.1	+4.9

† Nov., $13.411; Oct., $13.380.

ENR INDEX REVIEW

	Construction Cost 1913=100	Construction Cost 1949=100	Building Cost 1913=100	Building Cost 1949=100	Volume 1913=100	Volume 1949=100
1955						
Dec.	673.13	141.11	478.70	136.08	544	157
1955 Average	**659.72**	**138.31**	**468.80**	**133.33**	**600**	**173**
1956						
Jan	676.36	141.79	480.48	136.58	645	186
Feb	680.21	142.59	483.08	137.32	736	213
Mar	680.20	142.59	483.14	137.34	786	227
April	683.28	143.24	485.56	138.02	764	221
May	688.43	144.32	487.36	138.54	684	198
June	692.13	145.09	488.70	138.92	636	184
July	694.75	145.64	489.23	139.07	740	214
Aug	696.31	145.97	491.22	139.63	583	168
Sept	704.91	147.77	500.10	142.16	580	168
Oct	703.88	147.56	499.54	142.00	729	211
Nov	704.13	147.61	500.58	142.27	542	157
Dec	703.82	147.55	500.17	142.18	...	...
1956 Average	**692.37**	**145.14**	**490.76**	**139.50**		...

MATERIAL SHORTAGES

Supplies of building materials continue to ease, except for some steel items and a few key materials as follows:

- **Cement**—Slight shortage in Detroit. Also in Toronto.
- **Window glass**—Short in Denver.
- **Gypsum plaster board, lath, sheathing**—Still a slight shortage in Baltimore.
- **Crushed slag**—Slight shortage in Baltimore.
- **Wood paving blocks**—Slight shortage in Chicago.
- **Stainless steel building sheets**—Short in Birmingham, Boston, Cincinnati, Denver, Minneapolis, New York City, Philadelphia, Montreal, Toronto.

Outlays May Set New Record in 1957

Outlays for new construction put in place expected to total $46.5 billion—5% over record volume expected this year

The dollar value of construction put in place should set a new record in 1957, government experts predicted last week.

Outlays for new construction put in place are expected to total almost $46.5 billion in 1957, about 5% above the record volume expected for this year, according to estimates prepared jointly by the Departments of Labor and Commerce.

Almost every major type of construction is expected to show new gains next year, with the exception of private housing.

Because of the housing decline, private construction activity as a whole is expected to show only a nominal increase over this year's total, reaching a total of $31.4 billion in 1957.

However, public construction outlays probably will rise as much as 12%, to $15 billion, the government experts estimated.

Physical volume, expenditures adjusted for price changes, also may be up by late 1956 and will about equal the record set in 1955.

The anticipated volume of new construction in 1957, the government said, is based on the assumption that the general level of economic activity will advance moderately, with employment continuing at record levels and personal income reaching a new high. It was assumed also that international developments will not significantly affect construction activity in the United States during the coming year.

• Costs will be up—Construction costs are expected to rise, but at a rate slightly lower than this year.

Most building materials are expected to be in adequate supply, with no more than minor spot shortages likely, because of extensive gains in plant capacity and record production levels.

Mortgage funds, however, probably will continue to be relatively scarce, the government said.

This would be true especially for long-term, low down-payment loans, reflecting widespread competition for credit to meet the unusually large demands from industry, government, and individual consumers.

The dollar value of private, non-farm residential construction is likely to fall about 3% below this year's volume. Anticipated increases in spending for additions and alterations to older homes and for construction of motels and other non-housekeeping residential units will not be sufficient to offset completely the 5% decrease expected in outlays for new home building.

The decline in expenditures for new private housing, however, probably will be less than the drop in housing starts, since the dollar volume figure will reflect higher construction costs and the continuing trend toward larger homes.

The government is predicting that there will be about 1 million new private housing starts next year.

This compares with an annual average rate, seasonally adjusted, of 1.1 million for the first 10 months of 1956, and a 1955 total of 1.3 million.

• Utility expansion — Unprecedented gains in the size of construction programs planned by public utilities will be the biggest single factor in the increase in private construction outlays between 1956 and 1957.

There will be advances, however, in all types of new non-residential buildings, except commercial buildings. This category is expected to remain close to this year's record level.

The government also is predicting that private industrial building will continue to expand next year, but at a much lower rate than during the past two years.

The lower rate of expansion reflects fulfillment of capacity goals in some industries, and revision of expansion programs in others.

The $3.2 billion expected to be put in place on industrial buildings in the coming year will be an all-time high, exceeding this year's volume by 5% and topping 1955 by 33%.

The government estimates that outlays for commercial buildings will total $3.3 billion, with an increase for office buildings offsetting a decline for new stores and similar buildings.

Demand for additional office space is still high, the government says, as indicated by the continued low office building vacancy rate.

Forecast—Construction Put in Place: 1956 and 1957

Reported by U. S. Departments of Labor & Commerce

Type of construction	Estimate 1956 (Millions)	Forecast 1957 (Millions)	% Change '56-'57
TOTAL NEW CONSTRUCTION	$44,125	$46,400	+ 5
PRIVATE CONSTRUCTION	30,700	31,400	+ 2
Residential building (nonfarm)	15,200	14,700	− 3
New dwelling units	13,370	12,700	− 5
Additions and alterations	1,385	1,500	+ 8
Nonhousekeeping	445	500	+12
Nonresidential building (nonfarm)	8,800	9,275	+ 5
Industrial	3,060	3,200	+ 5
Commercial	3,300	3,300	0
Office buildings and warehouses	1,365	1,500	+10
Stores, restaurants, and garages	1,935	1,800	− 7
Other nonresidential building	2,440	2,775	+14
Religious	775	875	+13
Educational	535	550	+ 3
Hospital and institutional	325	400	+23
Social and recreational	270	300	+11
Miscellaneous	535	650	+21
Farm construction	1,500	1,550	+ 3
Public utility	5,080	5,750	+13
Railroad	435	450	+ 3
Telephone and telegraph	970	1,075	+11
Other public utility	3,675	4,225	+15
Local transit	25	25	0
Pipelines	350	375	+ 7
Electric light and power	1,900	2,100	+11
Gas	1,400	1,725	+23
All other private	120	125	+ 4
PUBLIC CONSTRUCTION	13,425	15,000	+12
Residential building	275	450	+64
Nonresidential building	4,050	4,500	+11
Industrial	425	425	0
Educational	2,560	2,850	+11
Hospital and institutional	305	375	+23
Other nonresidential building	760	850	+12
Military facilities	1,420	1,525	+ 7
Highway	5,100	5,500	+ 8
Sewage disposal	710	875	+23
Water supply	580	675	+16
Public service enterprises	450	475	+ 6
Conservation and development	660	800	+21
All other public	180	200	+11

The expected increase in public works activity next year reflects expansion in all types of state and local public works, especially highways, schools and sewer and water facilities.

Highway construction probably will reach a new high of $5.5 billion, about 8% above this year's level, principally because of the expanded federal aid highway program.

State tollroad construction is expected to decline somewhat, as work on new and continuing projects will not compensate for major completion this year.

• More schools–The continued trend to suburban living, with its new housing development, will also bring with it record expenditures of nearly $2.9 billion for public school buildings next year, while the value of new sewer and water facilities construction is expected to top the $1.5 billion level for the first time.

Public and private hospital construction, which has been declining since 1954, may show an upturn next year. However, hospital construction outlays are not expected to reach the level attained in the 1950-52 period.

Construction put in place at military bases is expected to set a new post-war high in 1957, although the increase over 1956 will be moderate.

Public housing will show the first significant expansion since 1951, primarily because of the new federal program of military housing under Title VIII. (The government includes this type of housing in public works.)

Conservation and development also is expected to go up for the second successive year.

(For breakdowns on individual categories, see accompanying table.)

School Financing

New York official urges new approach to problem because of rising costs

A thorough re-examination of the present system of financing school construction in New York State has been urged by State Comptroller Arthur Levitt, because of the rising costs of such financing.

First step toward a solution to the problem, Levitt says, would be formation of a non-partisan study committee composed of investment bankers, lawyers, municipal experts, school officials, and labor and civic representatives.

He wants such a committee to consider the feasibility of using the State Comptroller's office, in cooperation with the State Education Department, as fiscal agent for the marketing of local school funds.

As other possibilities, Levitt mentions establishment of a special State School Building Authority as agent, or setting up regional school building authorities.

He also suggests creation of a central fund to make money available to school districts at the same rate the state pays to borrow money. Under this plan, the state would issue bonds, with the amount based on a long-range projection of school building needs. Then communities could obtain the funds when needed, but would not be subject to bond market fluctuations.

Cities Seek More Federal Aid

American Municipal Association resolutions would have federal government increase its contribution to urban renewal projects

The American Municipal Assn. last week asked for more federal aid to help cities meet construction and operating costs.

At its thirty-third annual session in St. Louis, Mo., the association passed resolutions asking the federal government to:

- Raise its contribution for urban renewal and slum clearance projects from two-thirds of the land acquisition to loss to four-fifths.
- Increase payments to cities for municipal services furnished to federally-owned property.
- Provide special assistance to cities with depressed industries, including loans for construction or rehabilitation of plants; supplementary unemployment benefits and help in financing public works.
- End practices permitting some contractors on government work to escape local taxes.
- Provide funds to meet 75% of the administrative costs of recognized civil defense agencies and recognize that "Civil defense is primarily a federal responsibility."

Other resolutions called for closer co-ordination between federal arterial highway projects and slum clearance; and creation of a special committee to work with other agencies in making studies of the problems of metropolitan areas.

• Public works inventory–The urgency of city problems was pointed up by J. S. Bragdon, assistant to President Eisenhower for public works planning.

"Urban areas are unprepared organizationally to meet the problems of today, to say nothing of the future," Bragdon said.

A systematic inventory of public works requirements is needed, Bragdon said. And, he added, long-range plans must be developed to meet those needs.

There is no state at the present time that is carrying out comprehensive public works planning, Bragdon asserted.

"Until recent years," he commented, "Public works were built in a somewhat leisurely sequence. Today, with our tremendous population increase, our more highly-developed economy, the increased level of personal income and greater backlogs, pressures are upon us to fill the gap between what we have and what we need, much more rapidly than most municipalities are doing."

"The conflict of simultaneous demand for all types of facilities," Bragdon said, "now makes the necessity for effective, comprehensive long-range planning much more demanding than ever before."

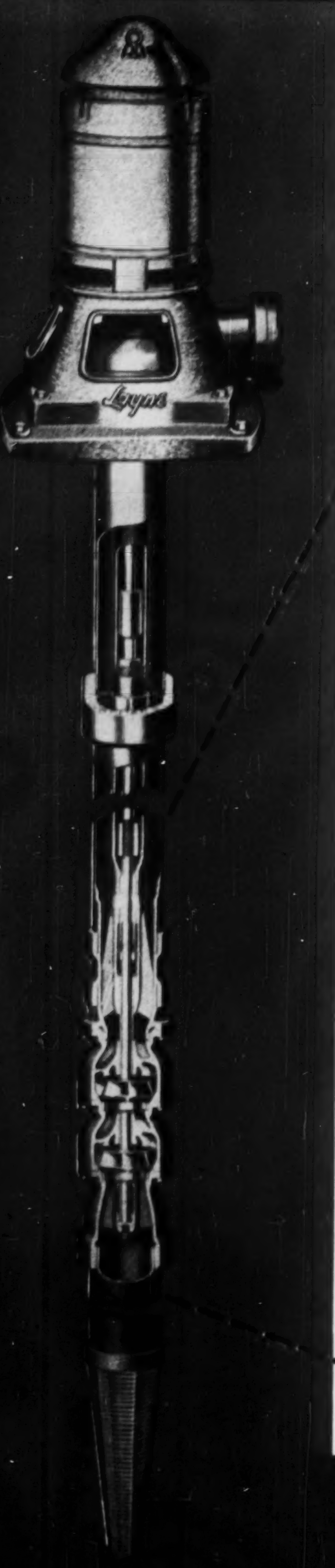
• Stresses backlog–Bragdon reiterated his earlier public estimate that states and cities must spend more than $200 billion to catch up with their present public works needs.

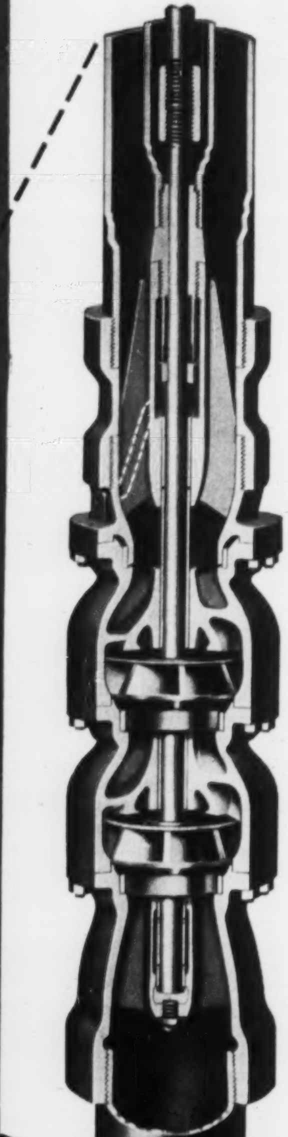
He told the American Municipal Assn. that $92 billion is needed for highways; $41.5 billion for schools, $22 billion for hospitals and other institutions; about $25 billion for water and sewerage facilities and $23 billion for various other public works.

Another speaker, Gov. Robert B. Meyner, of New Jersey, said urban regions must find new ways of acting to prevent "the continued disintegration of cities." He added that more effective control is needed over "the explosive pattern of urban redevelopment."

Mayor Ben West, of Nashville, Tenn., was elected as the new president of the association, succeeding Mayor Robert F. Wagner, of New York. More than 12,000 cities are represented in the American Municipal Assn.

(*B&F continued on page* 351)





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The basic design of Layne vertical turbine pumps has been tried and proved under all kinds of operating conditions, both good and bad, the world over.

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Industry
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Awards Set a New November Record

Month's heavy construction contracts total $1,735.7 million
11-month total is 16% above record-breaking pace of last year

Heavy construction contracts reported to Engineering News-Record and Construction Daily last month set a November record amounting to $1,735.7 million.

Awards came in at an average weekly rate of $347 million in November. This was below the October rate, because of a normal seasonal decline, but ahead of the previous record for the month, posted in 1955.

At the end of 11 months, heavy construction awards total more than $20.1 billion, 16% ahead of last year's record-breaking pace.

• **Industrial boom continues**—The industrial building boom showed no signs of a let-up in November. Awards totaled $412.9 million, well above October's $377 million, and the highest monthly total posted for industrial building since July.

The cumulative 11-month total for private industrial building is $4.9 billion—83% ahead of the comparable 1955 period.

Although private mass housing continued to drop, it still accounted for awards of nearly $356 million last month.

The decline in private mass housing in November showed up clearly in the weekly averages. In October, contracts averaged $111.5 million a week; in November, the weekly rate skidded to $71.2 million. This weekly rate was down more than 27% from the same period in 1955.

Although commercial building showed a drop from October, it still was well above November of last year.

Commercial building has boomed throughout most of 1956. The cumulative 11-month total for this category is $1,778 million—up 12% over the same period in 1955.

Little TVA Is Planned for Southwest Iran

An American company has started engineering studies in two river basins comprising the Khuzistan region in southwestern Iran as the first step in a program of agricultural and industrial development patterned after the Tennessee Valley Authority.

The American concern is the Development & Resources Corp., of New York City, headed by two former TVA chairmen, David E. Lilienthal and Gordon R. Clapp.

Together with Lazard Freres & Co., investment bankers, they formed the company last year to provide planning and administrative services in resource development to foreign nations.

Last March, the American company signed a contract with the Iranian Government Plan Organization, agreeing to plan and assist in carrying out the development of water, land, oil and gas resources of the Khuzistan region, a 58,000-sq-mi area north of the huge Abadan oil refinery located on the Persian Gulf.

The initial phase of the long-range development plan would include dams on the Karun and Karkheh Rivers, to provide flood control and water storage for irrigation projects, and hydroelectric power for industry and agriculture.

It is estimated that a system of storage dams in the upper reaches of the Karun and Karkheh would permit irrigation of about 2.5-million acres.

The project would be financed by the Iranian Government Plan Organization, an agency established in 1949 to use from 60 to 80% of Iran's oil revenues to accelerate the nation's economic development.

Engineering Construction Contracts November 1956

Engineering News-Record *reports continental U. S. Construction projects of the following minimum costs—Waterworks, excavation, drainage and irrigation, $44,006; other public works, $73,000; industrial buildings, $93,000; other buildings, $344,000*

Five Weeks—Thousands of Dollars (000 Omitted)

	November, 1956							U. S. Cumulative Eleven Months		%	
	New England	Middle Atlantic	South	Mid-West	West of Mississippi	Far West	Total U. S.	1956 (48 weeks)	1955 (47 weeks)	Change '55 to '56 Av. Wk.	Canada November 1956
Public Works											
Waterworks	524	2,751	2,785	8,949	15,492	1,112	**31,613**	**335,737**	243,012	+35	2,488
Sewerage	1,330	14,709	6,795	9,402	6,136	4,060	**42,432**	**548,810**	351,469	+53	3,901
Bridges	6,506	15,601	4,482	18,205	21,891	12,138	**78,823**	**587,278**	441,102	+30	4,674
Earthwork and waterways	1,066	7,593	4,340	4,030	10,881	9,457	**37,367**	**677,600**	493,196	+35	9,868
Streets and roads	10,180	31,101	37,929	63,249	75,591	39,428	**257,478**	**2,311,298**	1,939,348	+17	6,053
Public buildings, residential		4,600		3,123	794	400	**8,977**	**294,699**	239,612	+20	1,797
Other public buildings	14,488	55,413	16,682	52,555	41,941	37,064	**218,143**	**1,939,146**	1,548,836	+23	32,495
Unclassified	7,240	16,135	14,776	4,885	32,503	9,099	**84,638**	**975,239**	1,021,459	−7	2,709
Total Public	**41,334**	**147,963**	**87,789**	**164,398**	**205,229**	**112,758**	**759,471**	**7,669,807**	**6,278,034**	**+20**	**63,985**
Federal government (included in above classifications)	5,905	25,625	15,290	6,696	40,520	23,634	**117,670**	**1,567,849**	1,529,702	+0.4	16,034
Private											
Bridges								**4,404**	2,375	+80	
Industrial buildings	14,128	29,250	65,849	78,329	190,341	35,041	**412,938**	**4,938,099**	2,640,765	+83	23,104
Mass housing	13,113	170,209	16,106	85,912	45,389	25,099	**355,828**	**5,054,957**	5,698,650	−13	19,342
Commercial buildings	17,406	68,423	12,180	35,275	23,829	17,222	**174,335**	**1,778,116**	1,548,463	+12	25,600
Unclassified		320	4,054	2,790	13,835	12,152	**33,151**	**676,366**	860,514	−23	20,125
Total private	**44,647**	**268,202**	**98,189**	**202,306**	**273,394**	**89,514**	**976,252**	**12,451,942**	**10,750,767**	**+13**	**88,171**
Total Engineering Construction:											
November, 1956 — 5 weeks	**85,981**	**416,165**	**185,978**	**366,704**	**478,623**	**202,272**	**1,735,723**				**152,156**
October, 1956 — 4 weeks	78,697	480,167	285,522	384,987	320,095	328,873	**1,878,341**				124,150
November, 1955 — 4 weeks	70,912	235,978	166,265	341,815	324,809	229,348	**1,369,127**				260,61[illegible]
Eleven Months — 1956	**1,054,184**	**5,087,160**	**2,385,600**	**4,298,891**	**4,374,856**	**2,921,118**		**20,121,749**		**+16**	**2,041,957**
Eleven Months — 1955	810,552	4,617,575	1,821,800	3,763,748	4,006,779	2,008,347			17,028,801		1,702,086
% Change '55 to '56 (Av. Wk.)	+27	+8	+28	+12	+7	+42					+17

Tangled Web of Jurisdiction

Operating engineers shift ground in NLRB hearing on small power-tool dispute with building contractors in New Jersey

A jurisdictional claim over maintenance of small power tools asserted by operating engineers on a state-wide basis against some 500 building contractors in New Jersey has been dropped temporarily. In a case still pending in the regional office of the National Labor Relations Board in New York, the engineers have substituted, instead, a claim over the right to handle major repairs of the tools—work traditionally done by subcontractors in their own shops or by the manufacturers to whom the tools were returned. Outcome of the case may shed further light not only on the merits of such a claim but also on existing limitations in the law and in the construction industry's present machinery for handling jurisdictional disputes.

The case arose as the result of a contract demand for a clause covering maintenance of concrete vibrators, leveling machines, portable generators and power buggies. Engineers claimed the clause is prevalent in highway and heavy construction contracts. The Building Contractors Association of New Jersey resisted the demand on three grounds: It would add materially to building costs; maintenance work is done by the operating craft—laborers, for instance, on power buggies, carpenters on power saws; the issue already had created a number of jurisdictional disputes and the clause would "set off a wave" of them.

A strike ensued. Following the filing of an unfair labor practice charge based on strike efforts to obtain specific work assignments, Sec. 8(b) 4(d), the strike was called off under the threat of an injunction (ENR Sept. 13, p. 148).

The case returned to the NLRB under Sec. 10(k) of the Taft-Hartley Act, which allows the NLRB to "hear and determine" jurisdictional disputes when the disputing parties are not committed to the procedure of the National Joint Board. The dispute had not been formally submitted to the Joint Board by either the contractors, who are not signatories to the Joint Board Agreement, or by the engineers, who are subject to the Joint Board as the constitution of the AFL-CIO Building and Construction Trades Department now stands.

- **A switch**—At the NLRB hearing, evidence was presented that the maintenance work on small power tools consisted of gassin, oiling and greasing—all normally done by the crafts operating the tools—and that necessary major repairs are done by the contractors' subs, either in their own shops or by sending the tools back to the manufacturers.

During the hearing, which lasted three days and was adjourned to Jan. 8, the engineers switched from their maintenance claim to a claim over the repair of tools.

- **Some alternatives**—What course the case will now take is anyone's guess.

On procedural grounds, the pending charge may collapse, returning the issue to the forum of collective bargaining. This raises the possibility that the engineers, who are still working without a contract, could press the repair claim with a strike under the banner of "no contract, no work."

If the case continues, the board might make the original charge stick, thus preventing a strike over maintenance and opening the door to damage suits by the contractors.

But the board, if it continues the case, still will be faced with the enigma of a Sec. 10(k) proceeding: How far does the law permit the NLRB to go, and how far should it go, in determining a jurisdictional dispute? Is it the board's duty to check the validity of a claim that the Joint Board doesn't apply—a question raised by the lathers in their Cleveland dispute with carpenters? Can the NLRB legally make an affirmative work assignment decision, thus in effect making a contract for the parties and perhaps impinging on the freedom of collective bargaining?

So far, the law has been meagerly defined and the board's approach has been negative.

Precast Concrete

Carpenters see challenge in the use of precast pieces

The carpenters union has warned its members that use of prestressed and poststressed concrete presents a "serious challenge" to the union. Jurisdiction is claimed over both the form work for and the erection of precast pieces.

In the current issue of its monthly journal, "The Carpenter", the union cites precasting of concrete as a form of automation—not automation in the true sense of machines that need no human guidance, it points out, but in terms of "a process which introduces quicker and simpler ways of doing things".

After observing that the expanding use of precast concrete, whether prestressed or poststressed, is "dooming a great deal of cast-in-place work", the union makes three points:

- In some precast yards, employers are "chiseling" on wages. Precasting is classified as "common labor work", resulting in a threat to wage structures as well as to jobs.
- Form work, whether done at a construction site or in a precasting yard, requires the skills, tools and know-how of carpenters and is their work.
- Erection of precast pieces is also carpenters' work—it includes fitting, plumbing, aligning and setting.

The union urges its members to become "thoroughly acquainted" with the methods of precasting and the techniques of erection. "The work is ours", the carpenters conclude, "and we must be both willing and able to do it."

Lewis' Construction Union Notes Some of Its Merits

Following the opening this month of the new $6-million Cross-Valley viaduct near Scranton, Pa., the United Mine Workers' District 50, of which the United Construction Workers is a division, claimed credit for the labor peace that prevailed on the project. The claim highlights one of the purposes of the heavy and highway construction "Four-Way Pact" of AFL-CIO operating engineers, carpenters, laborers and teamsters.

Built by UCW labor, the viaduct—2.7 miles long and containing five bridges—was constructed by Central Pennsylvania Quarry, Stripping and Construction Co., which has a statewide UCW agreement.

Said District 50: "AFL craft unions sought unsuccessfully to halt the work at the outset, and assured the contractors they'd never be able to complete it unless they signed up with the multitude of AFL crafts. But the job, in all its phases, was completed by UCW workers in record time, and without jurisdictional disputes by crafts or interference from the AFL."

A Source of Money

Use of labor trust funds is urged for homebuilding

Building trades officials on the West Coast have suggested that labor consider investing in home mortgages some of the pension trust funds it has accumulated to help pull the homebuilding industry out of the slump tight credit conditions have caused.

The suggestion was made at a special meeting of bankers, manufacturers, labor leaders and homebuilders called in Berkeley, Calif., by the Associated Home Builders of Greater East Bay. In attendance were members of the Alameda County Building Trades Council and the Bay District Council of Carpenters.

Council Secretary C. R. Bartilini, speaking for the carpenters, cited growing unemployment among the building trades and pointed out that labor has a primary interest in the health of the homebuilding market paralleling that of the builders themselves. He noted that union trust funds form a mortgage potential that could materially ease the credit situation and said: "We realize, of course, that such investment would have to be approved or even originated at the national level, but through continuation of regional meetings such as these we can provide the impetus for national action."

It was suggested that further "grass roots" meetings be held in the hope that a "unified approach" to the homebuilding problem might emerge at the national level for Congressional consideration. Embracing all groups interested in homebuilding, with the National Association of Home Builders as the probable leader, the meetings would be regional in nature.

Right-to-Work Ordinance Is Adopted in California

Palm Springs, Calif., has become the first city in the nation to pass a right-to-work ordinance. Effective date of the ordinance, which outlaws the union shop, is Dec. 15.

Approved by a vote of six to one, the ordinance was proposed by the Palm Springs Employers Association, following AFL-CIO efforts to organize hotels and restaurants in the city. The measure, however, had been opposed by the Coachella Valley Contractors Association, the California State Federation of Labor and local labor unions.

Right-to-work legislation formerly has occurred only at the state level. The

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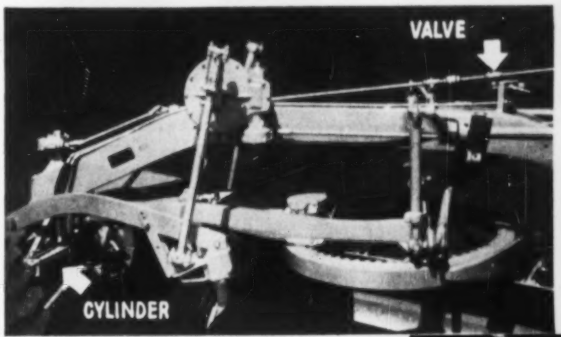

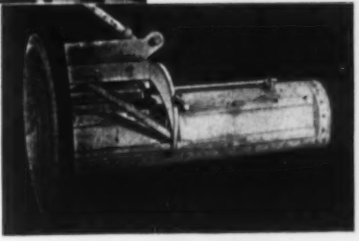

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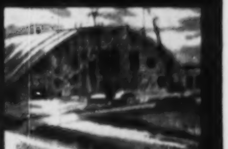

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right of states to pass such laws is contained in Sec. 14 (b) of the Taft-Hartley Act, which labor seeks to have repealed. Seventeen states now have right-to-work laws.

Labor groups have announced they will challenge the Palm Springs ordinance in court. Earlier, the League of California Cities had warned the council that the ordinance would be an unlawful invasion of the state's legislative power.

Picketing Picket Perturbs Pickets Picketing Project

Picketing construction workers who found themselves picketed in Oklahoma City, Okla., obtained a temporary restraining order last week against the picketing of the pickets.

The trouble started when a lone picket appeared at a construction project being picketed by the Oklahoma City Building and Construction Trades Council, whose pickets carried signs that read: "Building and Construction Trades Council Protests Wages and Working Conditions on This Job." The lone picket began to follow the other pickets.

His sign read: "Forced Labor Tactics Are Communistic."

In seeking the injunction, council attorneys argued that the picketing of the pickets was "an act of violence, intending to incite a riot."

Labor Briefs . . .

- **Taft-Hartley**—Frank J. Rooney, president of Associated General Contractors of America, has been named to Labor Secretary Mitchell's joint labor-management committee on Taft-Hartley Act revisions. Edward T. Kelley represented the AGC at the committee's first meeting.
- **Holiday week-ends**—Employees can be given the day off before or after a holiday in exchange for an extra day's work at straight-time in the week before or after the holiday without subjecting the employer to the overtime provisions of the Fair Labor Standards Act. Proviso in new Labor Department rules is union or employee agreement prior to the switch.
- **Picketing**—Organizational picketing was condemned last week as "a form of economic blackmail" and "a bludgeon on employers" by industry representatives at a Joint Legislative Committee hearing in New York. In defending the picketing, labor leaders said employers are adequately protected by existing safeguards in the laws as they now stand.

OFFICIAL PROPOSALS

Bids: January 3, 1957

New Jersey Turnpike Authority

CONTRACTS NOS. N-73A, N-73C, N-73D, N-73E, N-73F

Sealed proposals are invited for Contracts Nos. N-73A, N-73C, N-73D, N-73E and N-73F for the construction of the Service Building at Service Area EN, Jersey City, on the Newark Bay-Hudson County Extension of the New Jersey Turnpike, in Hudson County, as follows:

Contract No. N-73A.......General Construction
Contract No. N-73C.......Plumbing
Contract No. N-73D.......Heating and Ventilating
Contract No. N-73E.......Electrical
Contract No. N-73F.......Food Service Equipment

Proposals will be received at the New Jersey Turnpike Authority Administration Building, New Brunswick, New Jersey, until 11 O'Clock, Eastern Standard Time, on the morning of January 3, 1957, at which time and place said proposals will be publicly opened and read.

Each bidder must submit with his proposal a Contractor's Financial and Equipment Statement.

Contract documents may be examined during office hours on or after December 3, 1956, at the office of the Authority, and at the office of the Consulting Architects, Lorimer & Rose, 254 West 54th Street, New York 19, New York. Contract documents will be furnished upon payment of Ten Dollars ($10.00) for each set, upon application to the Authority. Contract documents are not required to be returned and payment will not be refunded.

NEW JERSEY TURNPIKE AUTHORITY
Paul L. Troast, Chairman

November 28, 1956

Bids: January 8, 1957

OFFICIAL PROPOSAL

Mobile, Alabama

Notice to Contractors

Sealed proposals will be received until January 8, 1957, at 1:00 PM by the Chief Engineer of the Gulf, Mobile and Ohio Railroad Company, 104 St. Francis Street, Mobile, Alabama. Proposals will be opened and read publicly at the Office of the Chief Engineer at that time. The work will consist of constructing the substructure of Bridge 216 over the Calumet Sag Channel, near Lambert, Illinois, 21.6 miles South of Chicago, on a new alinement, approximately 80 feet west of the present double track main line of the Railroad. The work will also include construction of two reinforced concrete underpass structures in the vicinity of the above bridge, known as Bridge 215½ and Bridge 220. Plans and contract documents may be obtained from the Chief Engineer upon deposit of $55.00 for each duplicate set. No refund will be made for contract documents returned. Payment shall be made by check or P.O. Money Order.

The work is subject to the inspection and approval of both the Chief Engineer of the R.R. Co. and the District Engineer, U.S.A., Chicago District.

U. S. Government

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Specifications No. DC-4807) will be received at Rock Springs, Wyoming, until January 8, 1957, for furnishing labor and materials for Earthwork and Structures for Laterals and Drains in Farson area, and Drains in West Side area, Eden Project, Wyoming. Location near Farson, Wyoming. Principal items are 1,063,000 cu. yds. excavation; 108,000 cu. yds. earth lining of laterals; 1,200 cu. yds. concrete in structures; 3,300 lin. ft. corrugated-metal pipe; 4,900 lin. ft. concrete pipe; and other work. Completion time 800 days. For particulars, address Bureau of Reclamation, P. O. Box 944, Rock Springs, Wyoming; or Building 53, Denver Federal Center, Denver 2, Colorado. W. A. Dexheimer, Commissioner.

U. S. Government

Bidding material for financing, constructing and selling to the Government under a purchase contract (lease-purchase basis) the United States Public Health Service Communicable Disease Center, on North Clifton Road, at Atlanta, Georgia, will be available for distribution on November 30, 1956. Applications from parties interested in bidding on this project should be filed promptly with this office or the Regional Office named below and the bidding material will be forwarded. Bidding material will not be furnished to subcontractors or to producers of materials or equipment. Bids will be opened at the place and on the date named in the bidding forms which will be about 4 weeks after the bidding material is available for distribution. Bidding material will be available at Room No. 1304, General Services Building, 19th and F Streets, N.W., Washington 25, D. C., Phone—EXecutive 3-4900, Extension 2397, and at the office of the Deputy Regional Director, Public Buildings Service, Region 4, 50 Seventh Street, N. E., Atlanta 5, Georgia. Commissioner of Public Buildings, General Services Administration.

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OFFICIAL PROPOSALS

Bids: December 20, 1956

New York State Road Work

NOTICE TO CONTRACTORS: STATE DEPARTMENT OF PUBLIC WORKS, ALBANY, N. Y.—Pursuant to the provisions of the Highway Law, Article 2, Title 9 of the Public Authorities Law, and special provisions for projects financed with Federal Aid Funds, sealed proposals will be received until ten-thirty o'clock A.M., eastern standard time on the 20th day of December 1956, by Henry A. Cohen, Director, Bureau of Contracts and Accounts, 14th Floor, The Governor Alfred E. Smith State Office Building, Albany, N. Y., for the following projects:

County	Contract No.	Name	Miles	Type	Deposit	Estimated Cost of Work
DISTRICT No. 1, G. L. Nickerson, District Engineer, 353 Broadway, Albany 1, N. Y.						
Albany	B.T. 56-4	New York State Thruway—Berkshire Section—Sub. B-1-A (Hudson River Bridge—West Approach)	3.38	9" Cem. Conc. Pavt. 2 @ 25' Wide=3.34 Mi.; Misc. Work=0.04 Mi.; 2 Hy. Seps. Comp. I-Beams 246.6' and 156.9'; 1 RR Sep. Comp. I-Beam 280.1'	$170,000 Plans $25	$3,138,000
Rensselaer	B.T. 56-3	New York State Thruway—Berkshire Section—Sub. B-1-B (Hudson River Bridge—East Approach) and 3 Cross Roads	4.33 (0.92 Acc.)	9" Cem. Conc. Pavt. 2 @ 25' Wide=4.28 Mi.; Bit. Mac. Ty. 1=0.92 Mi.; Misc. Work=0.05 Mi.; 6 Hy. Seps. Comp. I-Beams 164.8', 165.6', 238.9' 241.3', 193.5' and 200.5'	$265,000 Plans $50	4,892,000
DISTRICT No. 3, W. Robinson, District Engineer, Weigh Lock Building, Syracuse, N. Y.						
Oswego (Rte. 3)	FAC 56-7 FASH 56-5 FARC 56-61	Fulton-Hannibal, S.H. 772; Fulton-Volney, S.H. 1427; Fulton-Hannibal, Pt. 3; City of Fulton: East-West Arterial Project U-624(3)	3.51	9" Cem. Conc. Pavt. 24'-64' Var. Wide=1.81 Mi.; Asp. Conc. Ty. 2A=1.70 Mi.	$64,000 Plans $15	1,168,000
DISTRICT No. 4, B. F. Perry, Barge Canal Terminal, Rochester 1, N. Y.						
Livingston (Rte. 36)	FARC 56-103	Caledonia-Mount Morris, Pt. 4, S.H. 5665 Project F-1053(4)	0.30	9" Cem. Conc. Pavt. 24'-36' Wide=0.29 Mi.; Misc. Work=0.01 Mi.; Continuous Girder Br. 340'	$25,000 Plans $15	467,000
DISTRICT No. 5, E. G. H. Youngmann, District Engineer, State Office Bldg., 65 Court St., Buffalo 2, N. Y.						
Erie	FINTC 56-11 PSC 9058	New York State Thruway—Niagara Section—Sub. N5. Elimination of the Grade Crossing of the N.Y.C. R.R. and Porter Avenue: City of Buffalo Project I-865(13)	1.92 (0.92 Acc.)	Railroad Relocation=1.25 Mi.; 9" Cem. Conc. Pave. Var. Wide=0.77 Mi.; Asp. Conc. Opt.=0.59 Mi.; Misc. Work=0.23 Mi.; R.R. & Hy. Sep. Comp. I-Beam 192.5'; Ramp Comp I-Beam 223'	$65,000 Plans $25	1,174,000
Erie (Rte. 78)	FARC 56-85	Transit Road, Pt. 4, S.H. 1334A-1 Project U-651(7)	1.38	Asp. Conc. Opt.=1.33 Mi. Misc. Work=0.05 Mi.	$25,000 Plans $10	461,000
Erie	NT 56-7 NTC 56-8 STC 56-10	New York State Thruway—Niagara Section—Subs. N1 and N2 (Rossler-Clinton Sts.)	1.41 (2.27 Acc.)	9" Cem. Conc. Pavt. 2 @ 37' Var. Wide=2.02 Mi.; Asp. Conc. Ty. 2B=1.26 Mi.; Misc. Work=0.40 Mi.; 3 Hy. Seps. Comp. I-Beams 216.3', 191.8' and 217.8'	$230,000 Plans $50	4,150,000
Niagara (Rtes. 384 & 265)	FAC 56-12	City of North Tonawanda: River Road Arterial (Schenck Street to North City Line) Project U-865(12)	2.51	Asp. Conc. Ty. 2A	$74,000 Plans $25	1,339,000
DISTRICT No. 6, J. H. Thomas, District Engineer, State Office Bldg., 30 W. Main St., Hornell, N. Y.						
Chemung (Rte. 17E)	FARC 56-102	Big Flats—Fitch Bridge, S.H. 8411 Fitch Bridge—Elmira, S.H. 946 Project F-U-596(4)	2.05	Asp. Conc. Opt.	$65,000 Plans $25	1,136,000
DISTRICT No. 8, K. G. Rauer, District Engineer (Acting), Pleasant Valley Road, Poughkeepsie, N. Y.						
Columbia	BT 56-2 RC 56-104	New York State Thruway—Berkshire Section—Sub. B-3-B, (Co. Rd. 27 to Mass. St. Line); Austerlitz-Flatbrook-New Lebanon, Pts. 1A and 1C and Flatbrook-Massachusetts State Line, S.H. 8514 and Various Access and Cross Roads	7.50 (5.87 Acc.)	9" Cem. Conc. Pavt. 2 @ 25' Var. Wide=9.38 Mi.; Bit. Mac. Ty. 1=3.91 Mi.; Misc. Work=0.08 Mi.; 3 Hy. Seps. Comp. I-Beams 258.8', 276.7' and 313.5'; 1 Hy. Sep. Weld. Comp. Plate Gird. 500.6'	$460,000 Plans $100	8,569,000
Westchester	PSC 5942	Elimination of Grade Crossings of the N.Y.C. R.R. with Bedford Road and Manville Road in the Village of Pleasantville	1.44 (0.15 Acc.)	Railroad Relocation=1.44 Mi.; 8" Cem. Conc. Pavt.=0.13 Mi.; Asp. Conc. Opt.=0.02 Mi.; Relocation of R.R. Passenger Station and R.R. Freight House; 2 RR Seps. Comp. I-Beams 65' and 64.3'	$213,000 Plans $50	3,857,000
Westchester	FICWE 56-1	Interstate Route Connection No. 1—Cross Westchester Expressway (White Plains Section) (Project I-1101(1)	4.26 (10.52 Acc.)	9" Cem. Conc. Pavt. 2 @ 37' Var. Wide=11.93 Mi.; Asp. Conc. Opt.=1.41 Mi.; Misc. Work=1.44 Mi.; 22 Bridge Structures, Various Types From 30.5' to 1293' Spans	$745,000 Plans $100	13,576,000
DISTRICT No. 10, M. E. Goul, District Engineer, 325 W. Main St., Babylon, L. I., New York						
Bronx	FAMDE 56-2	Major Deegan Expressway and Extension Cont 19 (138th St. to N.Y. City—West. Co. Line) Project U-1082(23)	7.33	Miscellaneous Work	$9,500 Plans $15	171,000
Nassau (Rte. 101)	FARC 56-69	Middle Neck Road, S.H. 9019 Project U-541(10)	2.89	9" Cem. Conc. Pavt. 2 @ 25' Wide=1.59 Mi.; Asp. Conc. Opt.=1.13 Mi.; Misc. Work=0.17 Mi.	$93,000 Plans $15	$1,690,000
Nassau Rte. 27)	FARC 56-105 FASS 56-6	Conduit Boulevard, Pt. 3, S.H. 1699A (Sunrise Highway—Merrick Rd. Interchange); Merrick Road, C.R. 10 Project U-947(12); S-498(1)	0.62 (1.26 Acc.)	9" Cem. Conc. Pavt. 2 @ 36'-46' Var. Wide; 2 Hy Seps. Comp I-Beams 66' and 276.2'; 1 Ped. Overpass Weld. Pl. Girder 94.5'; Reinf. Conc. Box Culvert Br. (Ext.)	$150,000 Plans $50	2,846,000

Any projects in this letting that are on the Federal Aid highway systems are subject to the provisions of the "Federal-Aid Highway Act of 1956", being Public Law 627, 84th Congress, approved June 29, 1956, and are also subject to the applicable New York State statutes.

In compliance with the provisions of Section 115 (Prevailing Rate of Wage) Public Law 627, the minimum wages to be paid laborers and mechanics are included in wage schedules that are set out in the bid proposal.

Maps, plans, specifications and proposal forms may be seen and obtained at the office of the State Department of Public Works, Bureau of Contracts and Accounts, Albany, N. Y., and at the office of the District Engineers noted above, and may also be seen at the office of the State Department of Public Works, 270 Broadway, New York City.

The deposit for Plans and Proposal Forms for each contract is indicated above. A refund will be made in full to bidders for return of one set, in good condition, within 30 days of award, or rejection of bids; refund for all other sets in good condition, similar period, will be 50% of deposit.

Special attention of bidders is called to "General Information for Bidders" in the proposal, specification, and contract agreement, and to the special provisions applying to projects financed with federal funds. Award of a contract is subject to priorities and allocations under the Defense Production Act of 1950, as amended, and all regulations issued thereunder.

Proposal for each contract must be submitted in a separate sealed envelope with the name and number of the contract plainly endorsed on the outside of the envelope. Each proposal must be accompanied by draft or certified check payable to the order of the "State of New York, Commissioner of Taxation and Finance" for the sum as specified in the advertisement and the proposal. The retention and disposal of the bidding check, the execution of the contract and bonds shall conform to the provisions of the Highway Laws, as set forth in "Instructions to Bidders".

The right is reserved to reject any or all bids.

JOHN W. JOHNSON
SUPT. OF PUBLIC WORKS

Bids: January 15, 1957

State of Alabama

NOTICE TO BIDDERS

Sealed bids will be received by the State of Alabama, Alabama State Docks Department, at the office of the Director at the Alabama State Docks Department Office Building, Mobile, Alabama, until 10 A.M., Central Standard Time, January 15, 1957, and then publicly opened and read, for designing, furnishing of all plant, labor, equipment, materials and other facilities, and all other things necessary and proper for and incidental to the furnishing, fabricating, erecting and painting of a traveling unloading tower at the Bulk Handling Plant, Alabama State Docks Department, Mobile, Alabama, complete in place and ready for operation, all as described in plans and specifications prepared by Palmer and Baker, Inc., Consulting Engineers.

One lump sum bid only will be received.

Plans and specifications may be examined at the aforesaid office of the Alabama State Docks Department, and said plans and specifications may be examined and information obtained from Palmer and Baker, Inc., 957 Spring Hill Avenue, Mobile, Alabama, (Post Office Box 346). Complete copies of the foregoing documents will be furnished to bona fide bidders upon a deposit of fifty dollars ($50.00) per set. The deposit, if a bid is made, will be remitted after the opening of bids, provided the documents are returned complete and in good condition.

A certified check or a Bidder's Bond, payable to the Alabama State Docks Department, for an amount not less than five (5) percent of the amount bid shall be filed with the proposal, the Bidder's Bond being prepared upon the form specified and signed by a Bonding Company authorized to do business in the State of Alabama.

All bids shall be submitted in sealed envelopes bearing on the outside the name of the bidder, his address, and the designation of the work "Traveling Unloading Tower." If submitted by mail, the sealed envelope containing the bid, and marked as directed, shall be enclosed in another envelope addressed to:

Director
Alabama State Docks Department
Mobile, Alabama

No bid will be considered unless the Bidder, whether resident or non-resident of Alabama, is properly qualified to submit a proposal for this construction in accordance with all applicable laws of the State of Alabama. This shall include evidence of holding a current license from the State Licensing Board for General Contractors, Montgomery, Alabama. In addition, nonresidents of the State shall show evidence of having qualified with the Secretary of State to do business in Alabama.

The right is reserved to reject any and all bids and to waive informalities in any bid.

STATE OF ALABAMA
Alabama State Docks Department
Ward W. McFarland, Director

OFFICIAL PROPOSALS

Bids: December 13, 1956

Delaware River Port Authority

of the
COMMONWEALTH OF PENNSYLVANIA
and the
STATE OF NEW JERSEY
Administration Building
Camden, New Jersey
WALT WHITMAN BRIDGE CONTRACT
No. P-11

Sealed bids will be received for "Fencing, Miscellaneous Paving and Clean-up" for the Philadelphia and Gloucester Approaches of the Walt Whitman Bridge, known as Contract No. P-11, at the office of the Executive Director of the Delaware River Port Authority, Administration Building—Bridge Plaza, Camden, New Jersey, until 2:30 P. M., Eastern Standard Time, Thursday, December 13, 1956, at which place and time they will be publicly opened and read by the Authority.

A more complete description of the work and full information for bidders are given in the Contract Documents and Specifications for this Contract, which may be obtained upon deposit of $10.00 check, which will be remitted upon receipt of bid or the return in good condition, of the copies so taken within thirty days after the opening of bids.

Each proposal must be accompanied by a certified check in the sum of $10,000 payable to the Delaware River Port Authority and drawn upon a National or State Bank or Trust Company having an office or place of business either in Philadelphia, Pennsylvania or Camden, New Jersey, and must not be enclosed with the sealed bid. The surety's consent must be shown. The bidder to whom the contract is awarded will be required to furnish a Performance and Labor and Materialman's Bond in the sum of 100 percent.

The Authority will afford prospective bidders an opportunity to inspect the site of the work.

The Authority reserves the right to waive any informalities in the bids received; to reject any or all bids, and to award the contract only to those experienced in this class of work and to the bidder whose proposal is deemed by the Authority to be most advantageous to the public interest.

DELAWARE RIVER PORT AUTHORITY
JOSEPH K. COSTELLO
Executive Director

Bids: December 14, 1956

Washington Suburban Sanitary Commission

CONTRACT NO. 1899
FURNISHING AND DELIVERING
SODIUM SILICOFLUORIDE

Sealed proposals for furnishing and delivering a total of approximately one-hundred (100) tons of sodium silicofluoride will be received in the office of the Purchasing Agent, Room G-13, of the Washington Suburban Sanitary Commission, 4017 Hamilton Street, Hyattsville, Maryland until Friday, December 14th, 1956 at 11:00 A. M., Eastern Standard Time, at which time and place they will be publicly opened and read.

Specifications may be obtained from S. Z. Salsberry, Purchasing Agent of the Commission.

T. Earle Bourne, Chairman
Frank L. Hewitt, Jr., V-Chairman
J. Norman Ager
James B. Bland
Willard A. Morris
L. S. Ray
Commissioners

ATTEST:
John T. Bonifant
Secretary

Bids: December 14, 1956

Washington Suburban Sanitary Commission

CONTRACT NO. 1898
FURNISHING AND DELIVERING
SULFATE OF ALUMINA

Sealed proposals for furnishing and delivering a total of approximately five-hundred-seventy-five (575) tons of sulfate of alumina will be received in the office of the Purchasing Agent, Room G-13, of the Washington Suburban Sanitary Commission, 4017 Hamilton Street, Hyattsville, Maryland until Friday, December 14th, 1956 at 10:30 A. M., Eastern Standard Time, at which time and place they will be publicly opened and read.

Specifications may be obtained from S. Z. Salsberry, Purchasing Agent of the Commission.

T. Earle Bourne, Chairman
Frank L. Hewitt, Jr. V-Chairman
J. Norman Ager
James B. Bland
Willard A. Morris
L. S. Ray
Commissioners

ATTEST:
John T. Bonifant
Secretary

Bids: December 12, 1956

Washington Suburban Sanitary Commission

CONTRACT NO. 1896
FURNISHING AND DELIVERING
LIQUID CHLORINE (TON CONTAINERS)

Sealed proposals for furnishing and delivering a total of approximately three-hundred-twenty-five (325) tons of liquid chlorine in one ton containers will be received in the office of the Purchasing Agent, Room G-13, of the Washington Suburban Sanitary Commission, 4017 Hamilton Street, Hyattsville, Maryland until Wednesday, December 12th, 1956 at 10:30 A.M., Eastern Standard Time, at which time and place they will be publicly opened and read.

Specifications may be obtained from S. Z. Salsberry, Purchasing Agent of the Commission.

T. Earle Bourne, Chairman
Frank L. Hewitt, Jr. V-Chairman
J. Norman Ager
James B. Bland
Willard A. Morris
L. S. Ray
Commissioners

ATTEST:
John T. Bonifant
Secretary

U. S. Government

Sealed bids for construction of Wings, "A", "C" & "D" to Dog Kennels Building No. 28, National Institutes of Health, Bethesda, Maryland, will be received until 1:00 PM EST December 19, 1956 in Rm. 5333 GSA Bldg., 19th & F Sts., N. W., Washington 25, D. C., and then publicly opened in Rm. 1304. Bidding material is available to contractors desiring to bid the entire project in Rm. 1304 at the above address. Phone: EX-3-4900, Extn. 2397. Commissioner of Public Buildings, General Services Administration.

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Invitation No. DS-4812) will be received at Denver, Colorado, until January 8, 1957, for furnishing one 12.78-foot by 21.78-foot fixed-wheel gate for Helena Valley Pumping Plant Intake at Canyon Ferry Dam, Missouri River Basin Project, Montana. Delivery is desired within 300 days. For particulars, address Bureau of Reclamation, Building 53, Denver Federal Center, Denver 2, Colorado. W. A. Dexheimer, Commissioner.

United States Department of Commerce, Bureau of Public Roads, November 23, 1956. Sealed bids will be received at the Inter-American Highway Office, Bureau of Public Roads. Room 4009, General Services Administration Bldg., Washington 25, D. C. until 2 p.m., e.s.t., January 4, 1957 for the construction of Nicaragua project 8-A on the Inter-American Highway in Nicaragua, consisting of grading, drainage, selected borrow base and other work. The project begins at Sebaco about 60 miles north of Managua and extends north for about 48 miles to Condega. The approximate quantities of the major items of work are: 1,288,000 cubic meters Unclassified Excavation, 590,000 cubic meters Borrow Excavation, 186,000 cubic meters Selected Borrow Base Course, 3100 cubic yards Class A Concrete in Box Culverts, 365,000 lbs. Reinforcing Steel, 15,000 linear feet Nestable, Bituminous Coated Corrugated Metal Culvert Pipe (from 24" to 72"). Bids will be accepted only from United States or Nicaragua firms with a satisfactory record of performance on highway construction in the United States or in Nicaragua. The need for progress payments, where progress payments may legally be made, will not be treated as a handicap in awarding a contract. Plans, specifications, and Proposal Forms are available upon request from the address given above, or at the Inter-American Highway District Office, Bureau of Public Roads, 516 Avenida Roosevelt South, Managua, Nicaragua. C. D. Curtiss, Commissioner.

EMPLOYMENT OPPORTUNITIES

REPLIES (Box No.): Address to office nearest you c/o This publication Classified Adv. Div.
NEW YORK: P. O. Box 12 (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITIONS VACANT

Teaching appointments for September, 1957, available at university-associated College of Engineering in field of Civil Engineering. Salary and rank commensurate with experience and academic qualifications. Primary teaching field open as present faculty is flexible; preference, if any, would be in sanitary engineering and allied fields. Suburban location, Middle West, adjacent to large industrial center. P-3268, Engineering News-Record.

City Engineer: Unusual opportunity for graduate Civil Engineer or equivalent with professional license in southern Pennsylvania city. Experience essential in land surveying, street and sewer design and construction and related municipal work. Experience desirable in zoning and subdivision control. No structural design is involved. Would be in charge of Engineering Department, supervise survey crew and draftsmen, and would be expected to meet the public as required. Salary range $7,000 to $8,500 with usual benefits. Permanent non-political position for right man. Send resume of training and experience to: Borough of Chambersburg, 100 South Second Street, Chambersburg, Pa. Attention: J. G. Cree.

Wanted: Civil Engineer, registered in New Jersey, at least 10 years experience in road and bridge design and construction. Must have executive ability. State qualifications in full, experience resume, references and salary requirements. Reply to P-3307, Engineering News-Record.

Engineers for municipal and industrial water supply, sewerage and treatment projects. Opportunities for permanent connection with long established firm of consulting engineers in mid-west. Both E.I.T.'s and engineers considered. Full information and references in first letter requested. P-3116, Engineering News-Record.

Civil Engineers designers, draftsmen experience in the design of bridges, buildings, and waterfront structures. Excellent opportunity for advancement in expanding field of prestressed concrete. Write to Freyssinet Company, Inc., 57 William Street, New York City.

Draftsmen—Opportunity for growth with a new division of an old, established company. Openings for draftsmen with architectural, structural or mechanical experience. Send complete personal and employment history with compensation requirements. (Chicago location). P-3452, Engineering News-Record.

Structural Engineers—Two to ten years experience on buildings or bridges. Attractive offer with progressive consulting firm. Box 121, Station H, Toledo, Ohio.

(Continued on opposite page)

EMPLOYMENT OPPORTUNITIES

—RATES—

DISPLAYED

The advertising rate is $28.25 per inch for all advertising appearing on other than a contract basis. Frequency rates quoted on request.

An advertising inch is measured 7/8" vertically on a column—3 columns—30 inches to a page.

Subject to Agency Commission.

NATIONAL
COVERAGE

UNDISPLAYED

$2.10 per line, minimum 3 lines. To figure advance payment count 5 average words as a line.

Position Wanted ads take 1/2 of above rate.

Box Numbers—count as 1 line.

Discount of 10% if full payment is made in advance for 4 consecutive insertions.

Not subject to Agency Commission.

Send NEW ADS and Inquiries to Classified Advertising Division of ENGINEERING NEWS-RECORD
P. O. Box 12, N. Y. 36. December 20th issue closes December 10th

CONSTRUCTION SUPERINTENDENT

Established Chicago Road Builder needs man to assist General Superintendent in structure and road construction. This is a real good opportunity for right man. Technical education not essential.

P-3629, Engineering News-Record
520 N. Michigan Ave., Chicago 11, Ill.

WANTED

CIVIL ENGINEER, with municipal experience for city of 10,000 in southern California. College graduate preferred. Salary range (depending on qualifications) $6500 to $8000.

P-3631, Engineering News Record
68 Post St., San Francisco 4, Cal

POSITIONS VACANT

(Continued from opposite page)

Young or middle aged man that desires a permanent position with a progressive construction concern located in the Pittsburgh area. Experience in estimating, and construction management desirable. Write stating full educational, employment, and personal data. Your inquiry will be kept confidential, and answered promptly. P-3559, Engineering News-Record, Classified Advertising Division, P. O. Box 12, New York 36, New York.

Designers—Steel, Concrete, Electrical Piping, Air-Cond., Power Plants & Industrial Bldgs. Marbarry Corp., 120 Greenwich St., N.Y.C. Rector 2-3749.

Designer-Draftsman. Several positions open in structural, mechanical, or civil engineering in established engineering firm in Florida. Black and Associates, Inc., 700 S. E. 3rd Street, Gainesville, Florida.

Wanted: Draftsmen, also Bridge Designers and Highway Designers, preferably with some field experience for major highway and bridge projects. Forward education and experience records along with salary requirements. Brookhart & Tyo, Consulting Engineers, 1729 N. Front Street, Harrisburg, Penna.

A career for you in highway engineering. Recent graduates and experienced men are needed. Draftsmen, field engineers, bridge designers, road designers. Starting salaries, $5100-6300. Social security and state retirement. Vacation and sick leave. Employee credit union and hospitalization optional. Do you qualify? Write for application, details. Thomas E. Kilty, Personnel Director, Wyoming Highway Department, Cheyenne, Wyoming.

Estimator: for Estimating Department in Home Office of large building contractor. Permanent position with opportunity for advancement with aggressive, growing company operating throughout the U. S. Experience in estimating desirable but not essential. Write stating fully education, employment, salary requirements, military status and personal data to Blount Brothers Construction Company, P. O. Box 949, Montgomery, Alabama.

Wanted: Experienced Highway and Architectural Draftsmen, Bridge and Highway Designers for progressive young engineering firm offering usual fringe benefits plus paid insurance and profit sharing. Send resume to Michigan Associates, 221 N. Cedar St., Lansing 29, Michigan.

Engineers and draftsmen structural for steel and concrete design Public Buildings. Consulting Engineers office. Call or write giving training and experience. Saul Shaw & Co., 24 Commerce St., Newark, N. J.

Hydraulic Engineering Associate. Salary $596-$716. Three weeks vacation, liberal sick leave, retirement. Requires California C. E. license and four years experience. Contact Contra Costa County Civil Service, Box 710, Martinez, California.

CONCRETE ENGINEER

Wanted by large Ready-Mix Concrete supplier in northeast Ohio. Must know mix design and be able to trouble-shoot concrete. Write to following address, giving full particulars.

P-3649, Engineering News-Record
520 N. Michigan Ave., Chicago 11, Ill

POSITIONS VACANT

Assist. Prof.—To teach undergrad. courses in structures and applied mech. Salary depends on qualifications. Dept. of Civil Eng., Univ. of No. Dakota, Grand Forks, N. Dak.

Graduate Civil Engineers not over 30 and preferably single. Must have military training completed and interested in the building construction business, starting in the field. We offer opportunity for rapid advancement to ambitious, hard-working young men willing to accept responsibility. Starting salary $100.00 per week if unexperienced with higher wages for those with some experience. Send complete history data. Martin K. Eby Construction Co., Inc., 610 N. Main, Wichita 5, Kansas.

Field Superintendent: Reliable General Contractor with forty year clientele interested in contacting experienced field superintendent for handling large and moderate size construction jobs within 300 mile radius of Chicago. Apply P-3650, Engineering News-Record.

Wanted: Job Superintendent for midwest building construction company. Age 30 to 50. Salary and bonus if qualified. Submit education, experience, qualifications, starting salary. P-3633, Engineering News-Record.

Position open with growing Midwest contractor to handle sewerage and waterworks projects, both underground and treatment plants, from estimating, bidding to compleion on percentage of profits basis. Faciilties available to handle 3-4 million dollar volume yearly. Build your income as high as your ability. Send qualifications to P-3636, Engineering News-Record.

Position open for Civil Engineer as assistant in sponsored research on soils. Opportunity to do graduate work tuition free. College of Engineering at University in New York Metropolitan area. P-3635, Engineering News-Record.

The State of Connecticut has an immediate opening for a Senior Design Engineer (structural), salary range $5760-$8160. Ten years engineering experience or college graduation in engineering and six years of experience is required, including four years in supervision of engineering features of the design of large building projects. Apply to the State Personnel Director, State Office Building, Hartford, Connecticut.

The Connecticut State Public Works Department needs an architect for its Real Assets Division. The salary range is $4440-$6360. 8 years employment in architectural work or graduation from college in architecture and 4 years architectural experience is required. Apply to the State Personnel Director, State Office Building, Hartford, Connecticut.

Civil Engineer-Estimator: for industrial construction. Approximately 10-15 years of both estimating and job experience. Salary open, position permanent. Located in Florida. P-3632, Engineering News-Record.

(Continued on page 361)

ENGR.-COORDINATOR

Minimum 5 years experience job engineering or equivalent on petroleum and petrochemical plants.

Civil, Mechanical, or Chemical Engineering Degree required, plus minimum 8 years experience as responsible job site Field Engineer. Some construction supervisory experience also preferred.

Mail confidential, complete chronological resume, including education and employment (names and addresses of employers, dates employed, positions held and scope of responsibility, salaries received, nature and location of projects supervised, etc.) to Personnel Department.

HYDROCARBON RESEARCH, INC.

115 Broadway New York 6 NY

CIVIL ENGINEER

Young civil engineer interested in broad application of civil engineering.

Excellent opportunity with consulting firm. Liberal benefit plans and good working conditions. Location Middle West.

Send resume of education and experience with salary requirements to:

P-3223, Engineering News-Record
520 No. Michigan Ave., Chicago 11, Ill.

STRUCTURAL DRAFTSMEN

FOR HIGHWAY BRIDGE WORK

In New York City and New Jersey

BROWN & BLAUVELT

468 Fourth Avenue, New York City

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ARCHITECTURAL DRAFTSMEN

Opportunity for several competent senior men. Diversified institutional & hospital practice. Salary & advancement scaled to ability. Congenial environment 5 day, 35 hour wk, vacation, sick leave, insurance, etc. Send resume or call

YORK & SAWYER
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STRUCTURAL

ENGINEERS
DESIGNERS
DRAFTSMEN

Prefer several years' experience in any of these fields:

BRIDGES

BUILDINGS
EXPRESSWAYS
HYDRO PROJECTS
TEST FACILITIES*

Will consider lesser experience with good educational background. Several recent graduates will be added to our structural staffs to round out this planned expansion program. Occasional openings for combination men in construction supervision and inspection; must be free to move and to assume office duties between assignments.

Sverdrup & Parcel, Inc., are professional engineers engaged primarily in design work covering a wide scope of practice. The variety and unusual character of our work, including as an example the proposed world's largest bridge project, offer excellent opportunities for individual and professional development and advancement.

We need a large number of men for our general offices in St. Louis and several for our branch office in San Francisco. These are permanent additions to our regular staffs. Confidential interview can also be obtained at Washington, D. C., and Portland, Oregon.

Paid vacation, sick leave, holidays, overtime. Employee Benefits Plan furnishes retirement income plus life and disability insurance. Blue Cross. Moving alowance.

Please write fully, including salary data, to

SVERDRUP & PARCEL, Inc.
ENGINEERS — ARCHITECTS
915 Olive St. Louis 1, Mo.

*Designers of the technical facilities for the Arnold Engineering Development Center, operated by our subsidiary, ARO, Inc.

ESTIMATOR

(MECHANICAL)

Immediate opening for highly qualified Mechanical Estimator in large international engineering and construction company. Must have some field experience, knowledge of lump sum bidding and familiarity with process piping and other mechanical phases. Excellent salary, fringe benefits and career opportunities for the qualified applicant.

Call or Write Personnel Department

THE H. K. FERGUSON COMPANY
1783 East 11th Street Cleveland 4, Ohio
TOWER 1-6400

Engineers Architects

Highway Designers—Draftsmen
Rochester & Harrisburg, Pa., Jackson, Miss. & Ft. Lauderdale, Fla.
Bridge Designers—Draftsmen
Harrisburg, Pa.-College Park, Md.-Ft. Lauderdale, Fla., Jackson, Miss.
Architectural Designers—Draftsmen
Rochester, Pa.
Civil Engineering Draftsmen
Jackson, Miss.
Ink Tracers—Computors
Rochester, Pa., Jackson, Miss.

Air Mail Resume TO R. L. SHAW, Personnel Director

MICHAEL BAKER, Jr., INC.
BAKER BLDG. *Consulting Engineers* ROCHESTER, PA.

SANITARY ENGINEERS

$6600 to $9000

Positions available for two men in our well established and expanding Sanitary Engineering Department.

Requirements: Engineers with a college degree or equivalent in sanitary engineering and a minimum of 5 years' progressive experience on design of sanitary engineering projects.

Submit experience resumes and references.
Interviews will be arranged.

PATCHEN AND ZIMMERMAN, ENGINEERS
AUGUSTA, GEORGIA

CIVIL ENGINEERS
ARCHITECTS
DESIGNERS - DRAFTSMEN

FOR

ARCHITECTURAL
SANITARY-HIGHWAY
DEPARTMENT

Progressive Firm
Opportunity for Advancement
Permanent Staff Positions
Liberal Benefits
Application Form on Request
or
Submit Resume - Minimum Salary

to

CHAS. W. COLE & SON
220 W. LaSalle Ave.
South Bend, Indiana

ESTIMATOR

Minimum 3 years experience estimating union craft manhour requirements for constructing petroleum and petro chemical plants.

Civil, Mechanical, or Chemical Engineering Degree required, plus minimum 5 years responsible supervision of union crafts in construction of above plants. Some engineering design also preferred

OR

Minimum 2 years accredited college engineering with 5 years estimating and 10 years construction experience as detailed above.

Mail confidential, complete chronological resume, including education and employment (names and addresses of employers, dates employed, positions held and scope of responsibility, salaries received, nature and location of projects estimated and supervised, etc.) to Personnel Department.

HYDROCARBON RESEARCH, INC.
115 Broadway New York 6, N. Y.

••CIVIL ENGINEERS••

Minimum 3-5 years experience in structural design and construction of offshore structures, piers, drilling platforms, etc. Supervisory experience and ability to prepare economic and technical studies essential. Graduate civil engineers needed by major oil company operating in Venezuela. Salary commensurate with experience.

SUBMIT RESUME TO:
P.O. BOX #35
Bowling Green Station
New York 4, N. Y.

DESIGNERS and DRAFTSMEN HIGHWAYS and BRIDGES

Experienced men send resume and salary expected to—

C. W. RIVA CO.
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EXPERIENCED HYDRAULICS ENGINEER WANTED

Graduate engineer experienced in paper mill hydraulics, planning and development of piping layout systems, etc. for large expanding and progressive mill in Maryland. Good salary, all benefits and excellent opportunity for advancement. Send detailed resume of experience and education to

Director of Personnel
West Virginia Pulp & Paper Company
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McKEE has openings for top men to fill important, permanent positions, with excellent prospects for promotion to supervisory, staff and executive posts in our expanding organization.

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Telephone TOwer 1-2300, Cleveland, Ohio
or write to Edward A. Kolner,
Arthur G. McKee & Company,
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Arthur G. McKee & Company

Engineering offices in
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Opportunity available for wide varied experience and advancement in Consulting Sanitary Engineers' office on several large interesting projects. Salary commensurate with experience and ability to assume responsibility. Usual fringe benefits offered relative to hospitalization, group insurance, etc. Location southwestern Ohio. Apply giving name, age, education, experience, and salary—or for an interview.

P-3371, Engineering News-Record
520 N. Michigan Ave., Chicago 11, Ill.

STRUCTURAL ENGINEER:

Graduation from a college or university of recognized standing with a degree in engineering, specializing in structural engineering, and 5 years experience in a responsible capacity involving design of all sizes and classes of buildings and structures or an equivalent combination of experience and training. Salary $5980-$7020 per year. Complete details by writing to Director of Personnel Municipal Building, Hartford, Conn.

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Capable of handling field office work, building construction project; estimating changes, submission of drawings, cost accounting. List experience, education, references and salary. Job at Huntsville, Alabama. Opportunity for permanent position with growing organization.

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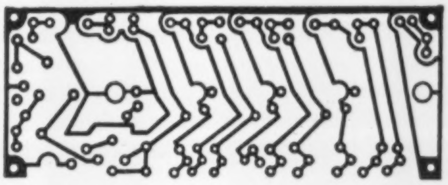
P. O. Box 949 Montgomery, Alabama



ELECTRICAL ENGINEERS

If you have had engineering experience in any of the categories shown below, Northrop Aircraft has an attractive position for you, with many benefits. Important among them are high compensation, challenging assignments, steady advancement, recognition of initiative and ability, and continued interest in your progress. Many outstanding engineering positions are offered, as follows:

ELECTRICAL GROUP, which is responsible for the design of such things as power generation and distribution systems, rectifiers and power converters, and auxiliary systems as applied to manned aircraft, guided missiles and ground support equipment.

COMMUNICATIONS AND NAVIGATION GROUP, which is responsible for the design of C/N systems in manned aircraft and installation of guidance systems in missiles.

FIRE CONTROL RADAR GROUP, which is responsible for the installation and application of the most advanced type of fire control systems in fighter-interceptor aircraft. The work covers the installation of the equipment and associated wiring; continuing liaison with equipment manufacturers; preparation of system analysis and reports; and follow-up of system performance in the field as aircraft become operational.

INSTRUMENT GROUP, which is responsible for the design of instrument systems for manned aircraft and the installation of flight test instrumentation for guided missiles.

There are also opportunities for draftsmen with either electrical or mechanical experience.

At Northrop Aircraft you will be with a company that has pioneered for seventeen years in missile research and development. Here you can apply your skill and ability on top level projects such as Northrop's new supersonic trainer airplane, Snark SM-62 intercontinental missile, and constantly new projects. And you'll be located in Northrop's soon to be completed multi-million-dollar engineering and science building, today's finest in comfortable surroundings and newest scientific equipment.

If you qualify for any of these representative positions, we invite you to contact the Manager of Engineering Industrial Relations, Northrop Aircraft, Inc., ORegon 8-9111, Extension 1893, or write to: 1015 East Broadway, Department 4600-A, Hawthorne, California.

NORTHROP

NORTHROP AIRCRAFT, INC., HAWTHORNE, CALIFORNIA

Producers of Scorpion F-89 Interceptors and Snark SM-62 Intercontinental Missiles

E-A-87

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Immediate Employment

Starting positions in California's highway expansion program. $436/mo. to start, with first raise after 6 months. Subsequent promotional opportunities to higher level positions. Open to recent college graduates in civil engineering. Write for illustrated booklet: C. S. WARNER, Supervisor, Section E, State Personnel Board, 801 Capitol Avenue, Sacramento 14, California.

ENGINEERS

Designers Detailers Draftsmen for work on Bridges, Expressways, Turnpikes

PERMANENT POSITIONS DEPENDING ON EXPERIENCE AND ABILITY

PAID VACATION, SICK LEAVE HOSPITALIZATION, LIFE INSURANCE

INCLUDE EDUCATION, EXPERIENCE, REFERENCES AND SALARY EXPECTED IN APPLICATION LETTER

Howard, Needles, Tammen & Bergendoff
1805 GRAND AVE. KANSAS CITY 8, MO.

STRUCTURAL and MECHANICAL DESIGNERS

Having experience with heavy material handling equipment

Permanent Position For Qualified Men

HOSPITALIZATION
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VACATION

Phone or Write Chief Engineer for interview

THE WELLMAN ENGINEERING CO.
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ENGINEERS COME SOUTH!

We have immediate openings for Engineers—Designers—Detailers—Draftsmen — Civil—Highway—Structural — Traffic—Architectural—Mechanical—Electrical. Company-paid hospitalization, life insurance and retirement. 40-hour week. Air-conditioned offices. Salaries $400 to $800, depending on education and experience. Permanent position. Excellent opportunities for advancement. Send complete resume of education and experience with salary requirement to:

PALMER & BAKER, Inc.
P. O. Box 346
MOBILE, ALABAMA

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Engineer with experience in maintenance and equipment engineering desired for the Paper Converting Division of the Rhinelander Paper Company. Experience in the paper industry desirable but not entirely necessary. Age 25 to 35. Salary open. Address Director of Industrial Relations, Rhinelander Paper Company, Rhinelander, Wisconsin.

STRUCTURAL ENGINEER

Permanent Position in New Orleans for qualified structural engineer

with at least 10 years responsible design experience in commercial and industrial fields and capable of design, directing and checking the work of others. Salary commensurate with education and experience.

Reply in full, giving particulars concerning salary, education, experience, references and availability.

DE LAUREAL & MOSES
Consulting Engineers
201 NOLA BUILDING
NEW ORLEANS, LOUISIANA

ENGINEER

Civil or mechanical engineering graduate preferred. Practical knowledge of soil mechanics desirable. Excellent opportunity for alert young engineer. Submit complete resume including salary desired.

RAYMOND CONCRETE PILE COMPANY
(Boring Division)
140 Cedar Street New York 6, N. Y.

STRUCTURAL DESIGNERS

FOR HIGHWAY BRIDGE WORK

SENIORS and JUNIORS

Work in New York City and New Jersey

BROWN & BLAUVELT
468 Fourth Avenue, New York City
44 Cooper Street, Woodbury, New Jersey

ENGINEERS

Long established firm of consulting engineers with world-wide practice needs both beginners and experienced civil, electrical, mechanical, and foundation engineers for interesting work on large dams, powerplants, and river control works. Permanent positions. Liberal employee benefits. Starting salaries dependent on qualifications. Please send complete resume to Hugo Niemi, Personnel Manager.

HARZA ENGINEERING CO.
400 W. Madison St. Chicago 6, Ill.

HIGHWAY DESIGN ENGINEERS

Permanent positions for men with degrees and 2 to 5 years' experience or equivalent. Work for old established consulting firm in Harrisburg, Pennsylvania. Excellent living conditions, fully paid retirement, insurance, vacation, holidays, new air-conditioned offices, hospitalization insurance available. Send resume to Modjeski and Masters, Harrisburg, Pennsylvania.

CIVIL ENGINEERS

New positions created in Madison, Wis. Graduate engineer with some experience to begin in Engineering Dept. at about $440 a month. Annual and longevity increases to $545. Office and field work in design and construction of sewer, water, street, sidewalk and curbs. Possession of Engineer-in-Training Certificate required. No residence restrictions for man to begin work. Wisconsin Retirement Fund and Social Security Benefits. Personnel Dept., City Hall, Madison 3, Wis.

ARCHITECTURAL ENGINEER

Architectural Engineer between ages of 25 and 35 with interest in design of industrial buildings and structures.

Excellent opportunity with consulting engineering firm in Middle West. Liberal benefit plans and good working conditions.

Send resume of education and experience with statement of salary requirements to:

P-3222, Engineering News-Record
520 No. Michigan Ave., Chicago 11, Ill.

HIGHWAY ENGINEERS

DESIGNERS DRAFTSMEN

Permanent Positions
Available in Florida and Pennsylvania
Excellent opportunities for advancement
Paid Vacation - Sick Leave - Hospitalization

Write for application forms or send resume

GLACE & GLACE, Inc.
1001 North Front St. Harrisburg, Penna.

POSITIONS VACANT

(Continued from page 357)

Teaching Positions—Applicants needed for additional permanent staff starting September 1957, in electrical, mechanical and civil engineering. Salary and rank open. Institution fully accredited, complete new Engineering School facilities, relatively small enrollment. Climate high, dry, and pleasant. Town of 20,000 free from usual big city inconveniences and irritations. Retired engineers and teachers considered. Send complete outline or inquiries to Dean of Engineering, Colorado A & M College, Fort Collins, Colorado.

SELLING OPPORTUNITY OFFERED

Concrete Coloring Glaze—Distributors wanted in most of U. S. See ad for Demicon Colored Glaze, page 76 this issue.

EMPLOYMENT AGENCY

Wanted Engineers, Designers, Draftsmen All lines. Chemists, teachers and industrial engineers. Recent grads. Cleveland Engineering Agency 2132 E. 9, Cleveland (15) Ohio.

EMPLOYMENT SERVICE

Salaried Positions $6,000 to $35,000. We offer the original personal employment service (established 46 years). Procedure of high standards individualized to your personal requirements. Identity covered. Particulars—R. W. Bixby, Inc., 559 Brisbane Bldg., Buffalo 3, N. Y.

POSITIONS WANTED

Salesman, estimator, production man experienced in large scale industrial roofing and sheet metal contracting, wants worth-while connection with growing firm. Can produce profitable sales in volume. Write PW-3430, Engineering News-Record.

Management position wanted in industrial roofing and sheet metal contracting, by highly experienced executive, capable and well-known in the industry. Write PW-3433, Engineering News-Record.

Bldg. Const. Eng. B.S. experienced 23, single, leaving Air Force. PW-3478, Engineering News-Record.

Civil Engineer, 36, Literate, Registered. Industrial, sanitary, hydraulic, structural design and inspection background. Prefer San Francisco Bay Area. Have office. PW-3573, Engineering News-Record.

Project Engineer, 37, registered N. Y., completing 4 years with A-E on European air bases. Experienced in office administration, and foundation, road, water, drainage and POL design and construction. Seeks permanent administrative position with future possibilities in direction. Location preferred in southern U. S. or South America. PW-3568, Engineering News-Record.

Superintendent—25 yrs. practical experience, business-engineering background for Highway construction & or allied operations. PW-3580, Engineering News-Record.

Construction Executive or engineer 25 years experience on heavy industrial construction, at home & abroad, mostly in oil refineries, highways, rubber & TNT plants & factory type buildings. Seek a permanent connection, location immaterial. PW-3425, Engineering News-Record.

Surveying field party, 3 or 4 men, fully equipped, well exp. in all types of work. Under Licensed supervision. Willing to travel. PW-3667, Engineering News-Record.

Civil Engineer, BSCE, MS in Eng., age 30, 6 years of diversified civil and sanitary engineering experience in design, specifications, construction and bidding. PW-3638, Engineering News-Record.

Executive—Management Capacity. Contractors Engineer. Sound progressive background in heavy construction: superintendence; engineering — planning, reports, estimating, scheduling and cost; contracts and subcontracts. BSCE; Registered Professional Engineer; age 38, married. Prefer to locate with reasonable permanence west of Mississippi or south. PW-3634, Engineering News-Record.

Executive Engineer—Designer—Checker and estimating with unusual work-progress control. Qualified Prof. Engr. Continuous background of accurate quantity take-off, unit costs, shipping and delivery on multi-million industrial and diversified construction. PW-3674, Engineering News-Record.

POSITIONS WANTED

Assistant superintendent . . . Bridge, tunnel, or heavy construction: cassion work. A specialty. Age 54—will travel. PW-3641, Engineering News-Record.

Construction Supt. or Assit. available immediately. PW-3607, Engineering News-Record.

Construction Management B.S.C.E. 26, Professional Engineer, 10 yrs. experience in job management and preparation of complete estimates for industrial, commerce and institutional building. PW-3610, Engineering News-Record.

Engineer with highway and other experience desires long term foreign employment. Excellent Spanish. PW-3616, Engineering News-Record.

Superintendent Bldg. Construction: Industrial, commercial, institutional, large scale housing, churches, etc. Position with reliable organization desired as field supt. 25 years experience, resident of N. J., will travel. PW-3651, Engineering News-Record.

POSITIONS WANTED

Construction Engineer Canadian, five years experience in building design, field supervision, organization of projects, estimating. Housing projects, industrial, commercial buildings, shopping centre. Location, Boston area. PW-3663, Engineering News-Record.

Attorney, 38, experienced in all phases construction law, contracts, litigation claims, appeals, arbitration, also heavy real estate law experience, desires connection New York Construction firm. PW-3654, Engineering News-Record.

Construction Eng./Supt. 36-15 years diversified experience sewers, R. C. structures, Subway, earthworks, surveys, estimates, seeks permanency. PW-3653, Engineering News-Record.

SELLING OPPORTUNITY WANTED

Philadelphia Representative with Warehousing Facilities handling AAA Re-Steel Accessories seeks additional lines. RA-3615, Engineering News-Record.

SEARCHLIGHT SECTION

(Classified Advertising)

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DISCOUNT of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads.

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The advertising rate is $23.60 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches to a page.

EQUIPMENT WANTED or FOR SALE ADVERTISEMENTS acceptable only in Displayed Style.

Send NEW ADVERTISEMENTS or Inquiries to Class. Adv. Div. of Engineering News-Record, P. O. Box 12, N. Y. 36, N. Y. December 20th issue closes December 10th.

REPLIES (Box No.): Address to office nearest you c/o This publication Classified Adv. Div.
NEW YORK: P. O. Box 12 (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

SPECIAL SERVICES

Contract Disputes? Government construction contractors who have contract questions under dispute are offered my experience in the settlement or the appeal of said disputes. SS-2433, Engineering News-Record.

Structural Designs — heavy industrial — bridges—commercial—pipe stress analysis—steel and re-bar detailing, by responsible P.E. SS-3617, Engineering News-Record.

BUSINESS OPPORTUNITIES

Opportunity for manufacturers of concrete pipe and concrete products. Ideal location—15 acres—in North Jersey served by two railroad lines. Source of supply adjacent to property will lease or arrange terms. Passaic Crushed Stone Co. Inc. Bloomingdale, N. J.

For Sale—Small Construction Company licensed to bid in North and South Carolina. All equipment and supplies that are needed for a complete small general construction company. A going concern. Equipment itself worth more than selling price. BO-3593, Engineering News-Record.

Part Time surveying business in northern Essex County, N. J., including 6 room house, $16,000. BO-3253, Engineering News-Record.

BUSINESS OPPORTUNITIES

New Jersey Licensed Engineer who likes municipal work. Must be able to invest Ten Thousand Dollars ($10,000.00) to obtain substantial share of well established private engineering company, Apply BO-3554, Engineering News-Record.

Engineers—Foremen—Office Men

Learn latest methods to organize and run work. Prepare for the top jobs.

Send post card for details.

GEO. E. DEATHERAGE & SON
CONSTRUCTION CONSULTANTS
P.O. Box 921 Lake Worth, Florida

Thousands of SUCCESSFUL BUILDERS USE
Building Labor Caculator

150 tables cover structural and finish in hours—tradesmen, helpers, foremen, and materials allowing normal waste. 1956 printing, ten day free inspection, money back guarantee, $10.00 postpaid:

TAMBLYN SYSTEM, Gordon M. Tamblyn
5732 Highland Court North, Kansas City 16, Mo.

STRUCTURAL ENGINEERING
ARCHITECTURAL ENGINEERING

OUR COURSES of instruction by mail HAVE HELPED THOUSANDS to better positions and to pass State Board Examinations. Forty third year.

Write today without obligation

WILSON *Engineering Corp*
College House Offices HARVARD SQ. CAMBRIDGE MASS.

EARTH BORING MACHINES . . our business

We manufacture Sterling Hydraulic Control Earth Boring Machines in sizes and models to fit your job and budget.

Sterling Model "A" for heavy duty work
Sterling Enterpriser, 6 cylinder model
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Complete parts are available for Sterling, Jaques and other make earth boring machines. We completely rebuild and repair all makes diggers in our well equipped shops.

SALES SERVICE ANY WHERE IN NATION

WYOMING VALLEY EQUIPMENT DIV.
714 WYOMING AVE. KINGSTON, PA.

FIVE EQUIPMENT BUYS FROM FRANTZ

Joy 600 cu. ft. Air Compressor, International UD-1091 Diesel Engine. This machine, new in 1956, was used less than five months. Today's new price, $15,125.00 (E-5071).....$10,500.00

Koehring Model 301 Crawler Liftcrane with Waukesha Gasoline Engine and 45' crane boom. (E-5541)................$3,000.00

Factory-new Quick-Way Full Half-Yard Truck Crane, Model 125, mounted on Crane Carrier Truck. Liftcrane-Clamshell-Dragline combination. 20% off list. (E-5117)........$20,000.00

Allis-Chalmers Model D Gasoline-Powered Tandem Grader equipped with Tractomotive Bucket Loader, Scarifier and Cab. Completely rebuilt. (E-4813).........................$4,500.00

Bros Model SP-54 Self-Propelled Roller, mounted on nine 7.50 x 15 pneumatic tires, and powered by Continental Gasoline Engine. Used four months only. New price $5800.00. (E-4929) $3,800.00

FRANTZ EQUIPMENT CO.

50th & Wynnefield Avenue Philadelphia 31, Penna.

GReenwood 7-7200

SHOVEL—NEW 1954

P&H Model 955 with a 2½ Yd. Rock Dipper OR 3½ Yd. Coal Loading Dipper, Waukesha 225 H.P. Diesel Engine and Torque Converter and Magnatorque

PRICED TO SELL

ANDERSON EQUIPMENT COMPANY

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Phone: LEhigh 1-6020

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FOR SALE

- EUCLID, rear & bottom dump, all sizes.
- SHOVELS & DRAGLINES, all sizes & makes.
- DRILLS, rotary & churn
- DOZERS & Front End Loaders
- TRAILER, 90 ton I-Beam

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Construction Equipment

311 W. Diamond Ave. — Hazleton, Pa.

Phone: Gladstone 5-4041 or 5-0253

8½ YD. SMITH

TRUCK MIXER

Used as Demonstrator for short time.

Excellent Condition.

Hodge & Hammond, Inc.

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New York Phone—Kilpatrick 2-2400

New Jersey Phone—Market 3,5424

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STATIONERY MIXERS

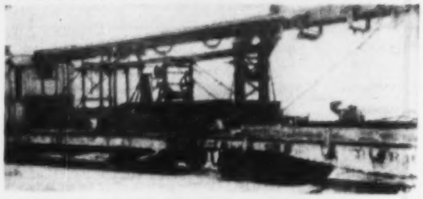
4—28-S Ransome & Knickerbocker stationary mixers. Gasoline or electric powered. Complete accessories. Open-end skip or batch hoppers.

THOMAS HOIST CO.

20 S. Hoyne Ave. Chicago 12, Ill.

INDUSTRIAL WORKS PILE DRIVER

BOILER AND
TWO DRUM HOIST
WITH
40' IDLER CAR
AND TENDER



C. G. WYATT MACHINERY CO., INC.

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FOR SALE OR RENT

2—100-ton capacity steel gin poles, 112'8" high. Boxing 48" square, corner angles 4 x 4 x ½", with 27'6½" balance beam. Weight 31,000#.

1—Model F. Wiley all-steel Stiffleg Derrick with 60' boom, 32' mast. Rated 30-ton @ 38' radius.

1—Model E Wiley Stiffleg Derrick with 60' boom, 30' mast. Rated 25-ton @ 38' radius.

1—American Model 530 Steel Stiffleg Derrick, 70' boom, 30' mast. Rated 10-ton @ 28' radius.

1—American Terry Model 1-75 Steel Erectors Guy Derrick, 85' mast, 75' boom. Rated 15-ton @ 30' radius.

1—Industrial Brownhoist Model 8 Diesel Locomotive Crane, Serial #11716, Cat. D13000 engine, 110' boom, 35-45 ton capacity. Perfect condition.

1—Industrial Brownhoist Model L Steam Locomotive Crane, Serial #5049, 110' boom, 40-50 ton capacity. Priced for quick sale.

Write for New Stock List No. 456

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CHICAGO 4, ILL., 327-J S. La Salle St.
NEW YORK 7, N. Y., 30-J Church St.

FOR SALE

P&H Model 1055 3½ C.Y.

Serial No. 13931, Buda Diesel Eng., 49109-F. Located Connecticut Turnpike. Available December 5, 1956

Price $45,000

FS-3622, Engineering News-Record
Class. Adv. Div. P.O. Box 12, N.Y. 36, N.Y.

LOW BED MACHINERY TRAILERS

Rogers—Model A20L Tagalong with special 4 wheel Dolly—20 ton capacity
Martin—Model F4T Folding Gooseneck Type Semi-Trailer—27 ton capacity
Transport Trailer Co. Model KSO-20D Drop Deck Semi-Trailer, 20 ton capacity

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PILING PILE FITTINGS · PIPE
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One Of The Largest Stocks In The East

Seamless and Welded ⅛" to 26" O.D. All wall thickness Manufactured. Specialty large sizes. Cutting — Threading — Flanging — Fittings — Valves.

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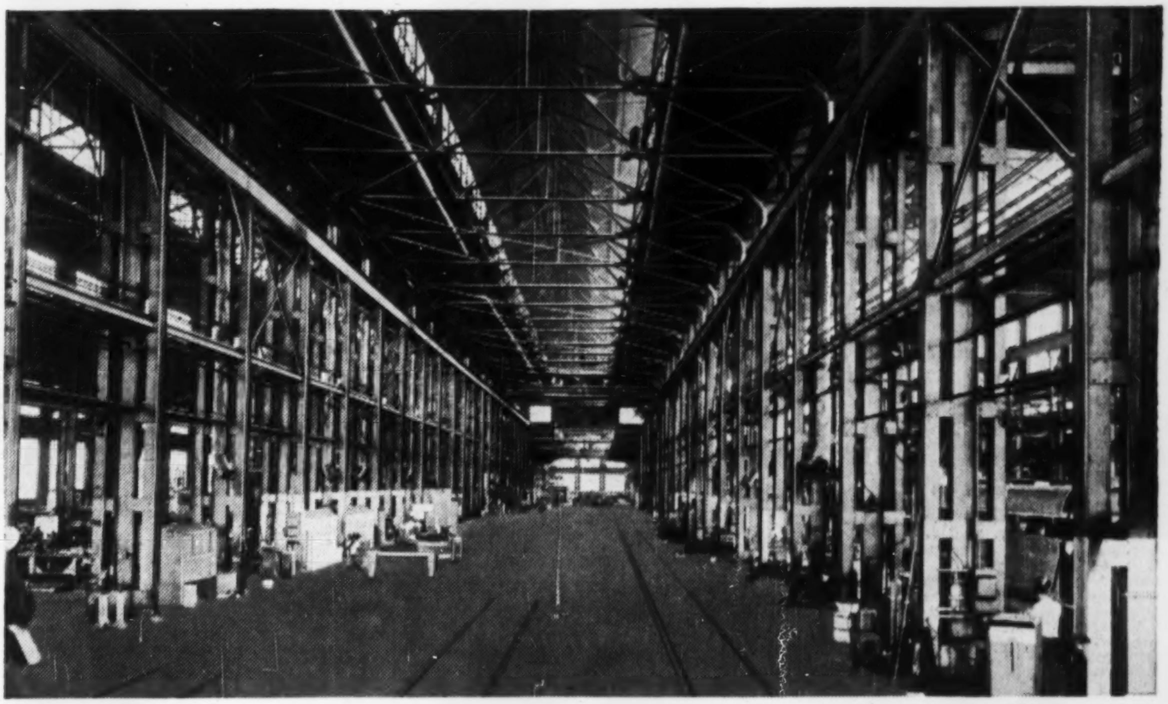
GLOBE PIPE & FITTING CO.

VALVES FITTINGS NEW **PIPE** USED FOR ALL PURPOSES

785 Metropolitan Ave., Brooklyn 11, N. Y.

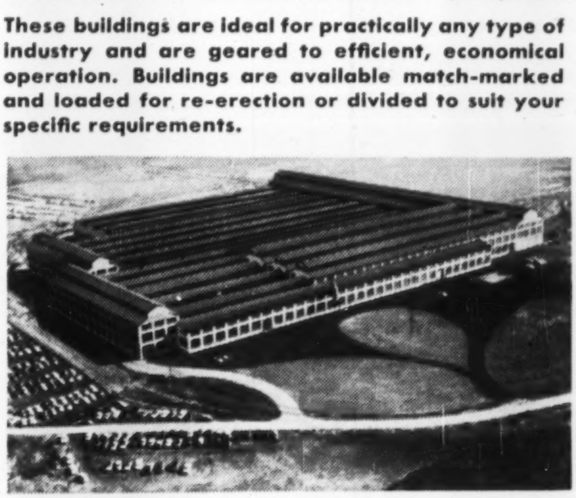
EVergreen 7-6220



SALE FOR RE-ERECTION MODERN INDUSTRIAL ONE-STORY STEEL BUILDINGS

10 MAJOR BUILDINGS COVERING 2,300,000 SQ. FT.
AVAILABLE IN UNITS FROM 30,000 TO 1,100,000 SQ. FT.

These buildings are ideal for practically any type of industry and are geared to efficient, economical operation. Buildings are available match-marked and loaded for re-erection or divided to suit your specific requirements.



LOCATED AT EDDYSTONE, PENNA. (SUBURB OF PHILA.)

- Lengths from 173 to 800 ft.
- Bays from 37 to 100 ft. wide. Clear span.
- 129 overhead traveling cranes.
- Buildings completely covered with 10 to 150 ton cranes.
- Buildings perfect for straight line production.
- Power sub-station equipment (includes transformers, switch gears, rotary converters and motor generator sets).
- Modern boiler plant. 600,000 lbs. per hr. of steam capacity—oil and coal fired. Built 1946.

129 OVERHEAD TRAVELING CRANES

From 3 ton to 150 ton capacity. 40 ft. to 80 ft. span. Immediately Available. Sold either separately or with building structure. These cranes are cab operated, 230 volt D.C. operation. Several of these cranes have auxiliary trolleys.

Detailed engineering data is available upon request. For additional information, write, wire or phone

LURIA BROTHERS & COMPANY, INC.

PHILADELPHIA NATIONAL BANK BLDG.—PHILA. 7, PA. • RIttenhouse 6-7455

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Located Downsville, N. Y.
All offered subject prior sale

10—EUCLID Bottom-Dumps Mod. 43 FDT, 13 c.y.
1—EUCLID Loader, Model 3 BV, Serial BV 22
8—STERLING HCS297 13 c.y. End-Dump Trucks.
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1—BUCYRUS-ERIE 2½ c.y. Shovel/Dragline.
1—LORAIN T20 ½ c.y. Moto-Crane, Shovel/Crane/Backhoe Combination.
1—Dipper Handle for P. & H. 1055.
1—Digging Bucket for P. & H. 1055, 3½ c.y.
1—MEAD-MORRISON 2 c.y. Re-Handling Clamshell Bucket.
1—OWENS Clamshell Bucket, ¾ c.y., Type D.
1—HELTZELL Concrete Bucket, 1½ c.y.
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4—WORTHINGTON 2-Stage Turbine Pumps, Model 12-QG-H2 (2 electric and 2 diesel driven); capacity 1500 GPM @ 110 ft. head, @ 1770 R.P.M.
GROUP OF 12 ASSORTED PUMPS (Marlow, Carter, Gorman-Rupp, C.H.&E., Worthington, 3" to 6", Centrifugal).
1—BRUNNER Elec. Compressor, H07-BC.
1—INGERSOLL-RAND Electric Compressor, V253-NS.
1—INGERSOLL-RAND Compressor, Portable, 315 c.f.m., Cummins diesel engine HB6.
1—WESTINGHOUSE Electric Compressor, Model 3 VC.
1—HOBART Elec Welder, 300 amp. 220/440 V.
1—WESTINGHOUSE Electric Welder, 300 amp. Model DC-Type RA-220/440/550 V.
1—P. & H. Electric Welder, Type WG-301. 60/375 amp. Generator; Chrysler Model IND engine, type 6A-211.

LARGE ASSORTMENT AIR TOOLS (Jackhammers, Pavement Breakers, Tampers, Rivet Hammers, Busters, Impact Wrenches, etc.)

MISCELLANEOUS SMALL EQUIPMENT AND POWER TOOLS (Power Saws, Drills, Sanders, Grinders, Bar Bender, Light Plants, Hydraulic Press, Hydraulic Jacks.)

REPAIR PARTS—Large Stocks—for Allis-Chalmers, Tractor and Grader, Baker Bulldozer, Bendix-Westinghouse, Buda, Cummins and G.M.C. diesel engine, Caterpillar Tractor, Delco-Remy, Euclid, International Tractor TD24, International Dodge and Ford Truck, Gar Wood Hydraulic Hoist, Jaeger Mixer, LeTourneau, Lima Shovel, P. & H. Shovel, Rex Pumpcrete, Sterling Truck, and others. Also large stock miscellaneous hardware items (bolts, nuts, etc.) Complete lists furnished on request. *Will price right for bulk sales.*

"GRIZZLY" EARTH PROCESSING PLANTS
Plant No. 1—designed to produce 2,600 c.y. per hour of "B" Pervious material.
Plant No. 2—designed to produce 1,350 c.y. per hour of "A" Impervious material.
BOTH PLANTS COMPLETELY DISMANTLED
Ask for detailed list of components

BIANCHI CENTRAL,
MUNROE-LANGSTROTH, RUGO
A Joint Venture
24 Union Avenue Framingham, Mass.
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1—25 ton Bay City Truck Crane
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Tractor Mounted—Bit Size to 6½"

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BOTH UNITS WITH NEW SLEEVE TYPE MODEL DHD 325-A DRILLS

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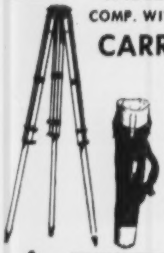

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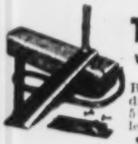

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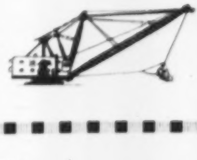

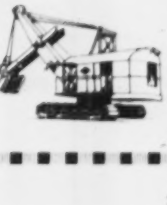

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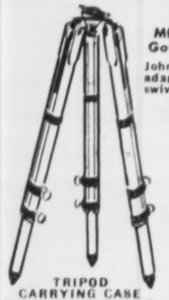

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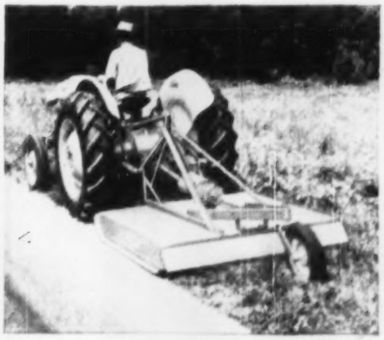

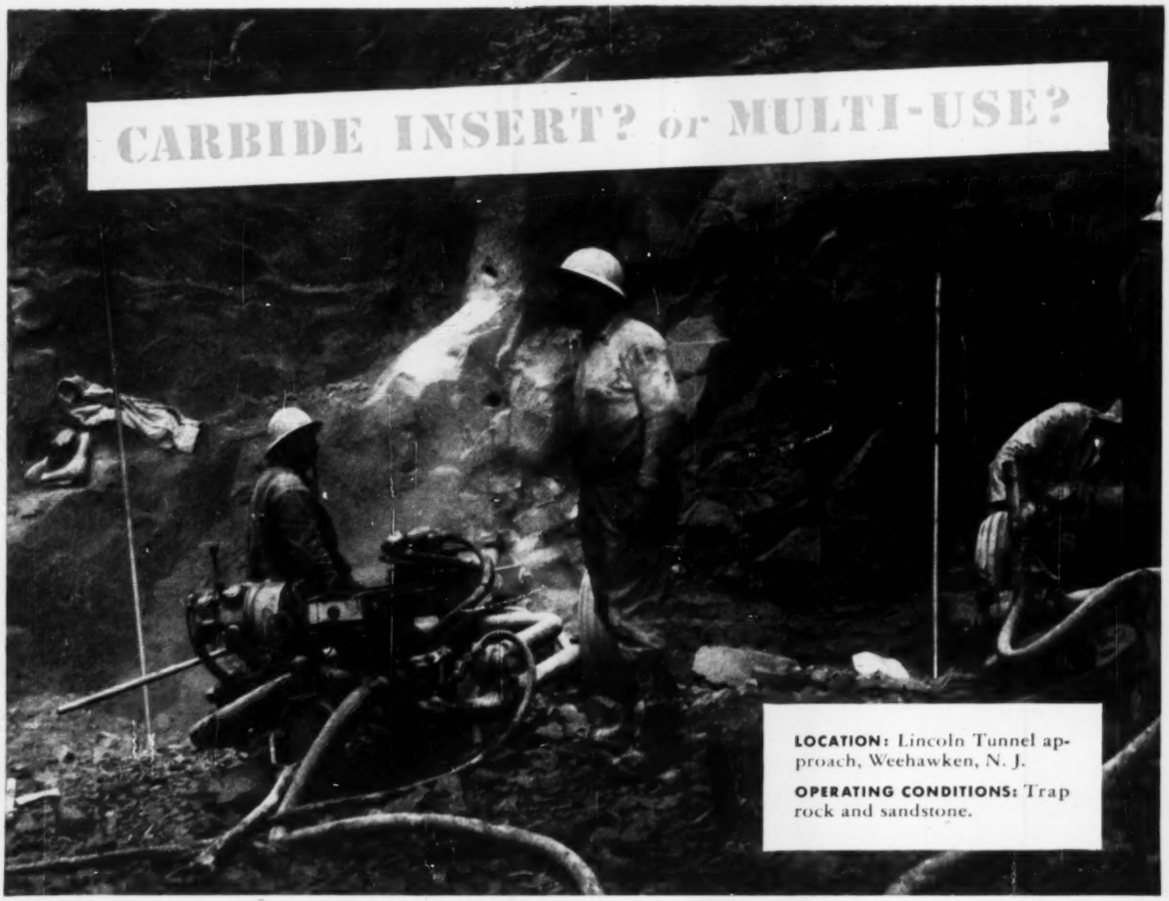

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